160 - 500 kVA single and parallel UPS Systems User’s and Installation Manual

160kVA - 500kVA UPS User's and Installation Manual

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1 Safety Instruction

The unit must be used as intended. Follow the instructions given in the Operating Manual.

The UPS must be installed and serviced by manufacturer, technicians or authorized personnel only.

If necessary, only original spare parts are allowed.

See installation instructions before connecting to the supply.

Dangerous voltages are present inside the unit.

Installation and use of this equipment must comply with all national and local regulations and procedures.

To prevent overheating, do not obstruct for ventilation grills of the unit.

The components inside the unit are not repairable by the user. The user must not open the UPS cabinet or auxiliary cabinets or remove any protective covers from inside the UPS cabinet.

To completely isolate the equipment, the switches IRP, IRE, IBY and IUG must be open, the input supply and the battery supply must be isolated from the UPS and the output isolated from other modules if the unit is part of a multi-module system.

Capacitors inside require 5 minutes to discharge to a safe level after all power is removed. See service manual for instructions.

High leakage current: connect protective earth before power supply cables.

Earth leakage protection: this device has a high leakage current to protectition earth. The maximum earth leakage current is 300 mA. When setting the threshold of the earth leakage circuit breaker installed upstream from this equipment consider this amount of current and that due to the loads.

An earth-fault protection device must be installed upstream, the UPS in accordance to all applicable local regulation.

All primary power switches installed downstream of the UPS must be labelled as follows: "Isolate UPS (Uninterruptible Power Supply) before working on this circuit".

All primary power isolators installed remote from UPS require the fitting of a waring label: "Isolate UPS (Uninterruptible Power Supply) before working on this circuit", if the automatic beckfeed isolator is not installed.

The unit is provided with an E.P.O. (Emergency Power Off) function. This function is activated by opening the contact at pins 1-2 of terminal TB9. This function provides UPS disconnection from the load and from the battery (if a shunt trip is installed in all the battery cabinets connected to the UPS and they are connected to terminals XA1, XA3 of the UPS). Dangerous voltages will still be present inside the unit, unless a shunt-trip for the input supply and external battery breakers is provided. The EPO condition is reset if the contact is closed after having opened, for this reason use a contact that latches in the open position and that can be reset only intentionally.

During electrolysis, batteries release hydrogen gas. There is a risk of an explosion if the amount of hydrogen in the battery room becomes too high. Ensure appropriate ventilation of the battery room according to the standard 62040-1-1, to prevent the risk of an explosion.

Install the UPS in a temperature and humidity controlled, indoor environment. Ambient temperature must not exceed 40°C and relative humidity 95%.

These UPSs are products for restricted sales distribution to informed partners. Installation restrictions or additional measures may be needed to prevent disturbances.

2. Introduction

This User's manual gives basic information about 160 - 500 kVA uninterruptible power supplies: their basic function, their features, how to use them, and what to do in case of trouble. Instructions for shipping, storing, handling and installing the equipment are also given.

The planning guidelines of this manual describe only the specific demands of UPS units. Local legislation and regulations for electrical installations must be followed in the UPS installation.

This manual is mainly intended for the chief operator/system supervisor, electrical consultants and installation electricians.

The UPS system must be installed according to the instructions in this manual. Fixed installation may be performed by qualified personnel only. Failure to recognise the electrical hazards could prove fatal.

2.1. System description

A UPS (Uninterruptible Power Supply) protects different types of sensitive electrical equipment: computers, workstations, sales terminals, critical instrumentation, telecommunications systems, process control systems, etc. The UPS protects them from problems associated with utility power of poor quality, or a complete loss of power.

Sensitive electrical equipment needs protection from electrical interference. Interference from outside the facility (such as lightning, power company accidents and radio transmissions) and interference from inside the facility (from motors, air conditioners, vending machines and arc welders, for example) can create problems in the AC power line for the sensitive equipment. The problems can be: power outage, low or high voltage, slow voltage fluctuation, frequency variations, differential and common-mode noise, transients, etc.

The UPS cleans the utility AC power, maintains a constant voltage and if needed isolates the output to the critical load. These actions help to keep power line problems from reaching the critical system, where they can damage software and hardware and cause the equipment to operate erratically.

2.2 UPS features

This UPS is a double conversion on-line UPS for protection of computer systems and other intelligent devices such as measurement instruments and industrial automation applications. It conditions the raw mains and supplies continuous, clean three-phase power to the critical systems. While feeding the load the UPS also keeps the battery constantly charged. If utility power fails, the UPS will continue to supply clean power without any interruption at the UPS output.

If the power failure outlasts the backup time the UPS will shut down in order to prevent a total discharge of the battery. When the line voltage is restored the UPS will start up again automatically providing power to the critical load and charging the battery bank.

UPS block diagram

An UPS module consists of several blocks each having its own functions:

- Transients in the input and load are reduced by RFI filters.
- AC-power is rectified and regulated in the rectifier which provides the power to the inverter and charges the batteries. The rectifier keeps the battery fully charged.
- The battery provides power to the load during a mains failure.
- The inverter converts the DC-power back to AC-power, which is delivered to the load.
- The static bypass switch transfers automaticly the load to the bypass line when the inverter is overloaded or the inverter is not able to feed the load.
- Maintenance bypass switch is used to bypass the single UPS during service.
- The control and monitoring circuits measure, monitor and control the operation of the UPS-system. It gives the user the status of the system operation by visual and audible indicators.
- The UPS sends information about the system operation via potential free relay outputs and RS232 serial data interface This information includes data about the utility, the load and the UPS itself. The information can be used in a computer to ensure total protection of software and data.

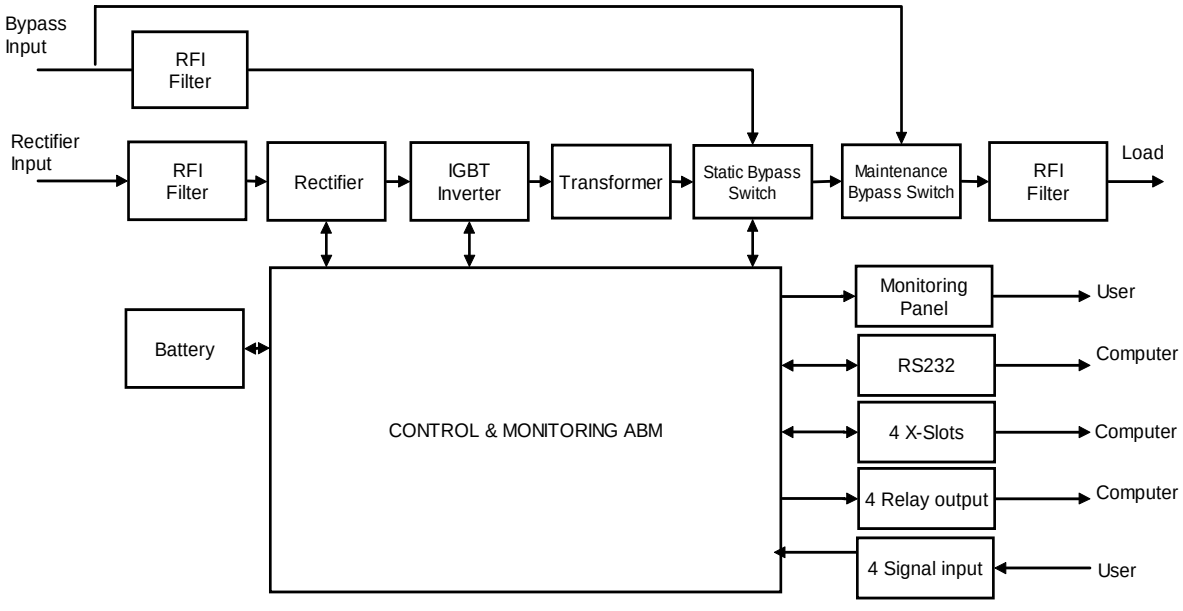


Figure 1. Block diagram of the UPS.

Advanced Battery Management (ABM)™

ABM monitors the status of the battery and charges it only when the battery needs charging. This feature is very valuable since most of the time the battery does not need charging. Hence, the function of ABM is to prolong the battery life by up to 50% on average. It also ensure that the load never looses power because of bad or defective battery.

The key to long battery life is low corrosion inside the battery. The main cause of corrosion is current flowing through the battery. The more current flowing through the battery, the shorter the battery life. Current flows through the battery when it is discharged or charged. There is very little that can be done for discharging, because it depends on the number of power outages in the utility line. However charging can be controlled and initiated on the following occasions:

- When turning the unit on using the on/off switch.
- After 18 days without charging
- If the open cell voltage decreases below predetermined voltage level.

Traditional UPS charge batteries continuously. This means that there is current flowing through batteries all the time and this causes corrosion. In a traditional on-line UPS the inverter also causes ripple-current to be fed to the batteries, causing corrosion.

Hot Sync™ for parallel UPS systems

A parallel UPS system means the linking together of two or more UPS units in parallel so that in the unlikely event one fails the others can automatically take up the load. Traditionally a parallel redundant configuration uses a common paralleling logic circuit in the system. This logic circuit provides individual commands to all the different units. Unfortunately this can lead to a single point of failure for the whole system because if the logic system fails the whole UPS system will malfunction.

That is why Hot Sync™ technology was developed. An industry leading paralleling technology in its own right, the patented Hot Sync enables you to set up a parallel redundant system giving you 100% conditioned power at all times. Its unique digital design eliminates the system level single point of failure inherent in traditional parallel UPS modules, and exponentially increases the reliability of the overall system.

Hot Sync allows two or more UPS units to cover the same load in parallel and/or redundant configuration, by working in complete synchronization. No common logic is needed in this patented design. It provides automatic load sharing and module level redundancy with nothing other than the power connecting the Hot Sync UPS modules.

2.3 UPS configurations

The UPS system consists of the UPS device itself and the external backup battery. In addition, several options may be included in the system.

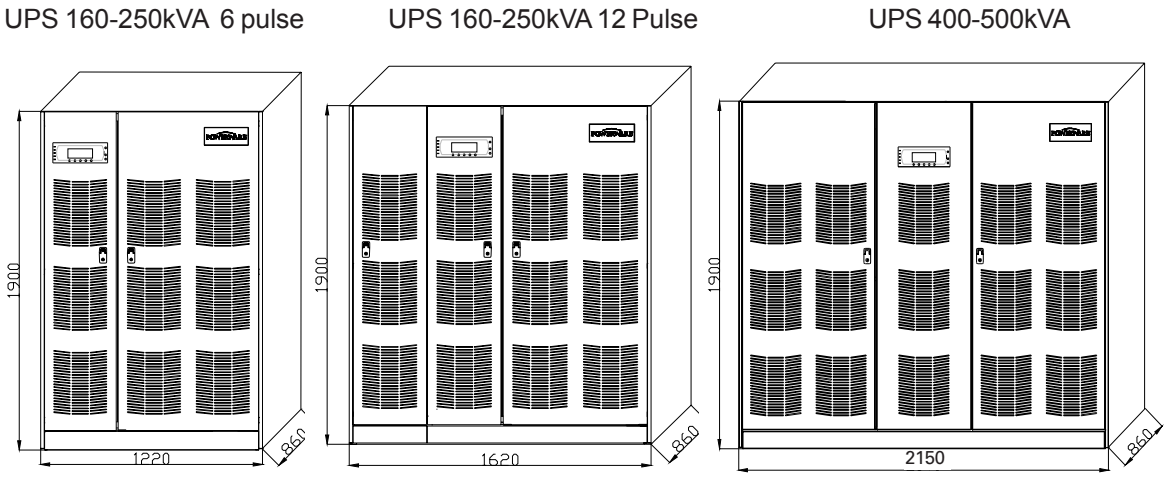


Figure 2. Dimensions of the UPS.

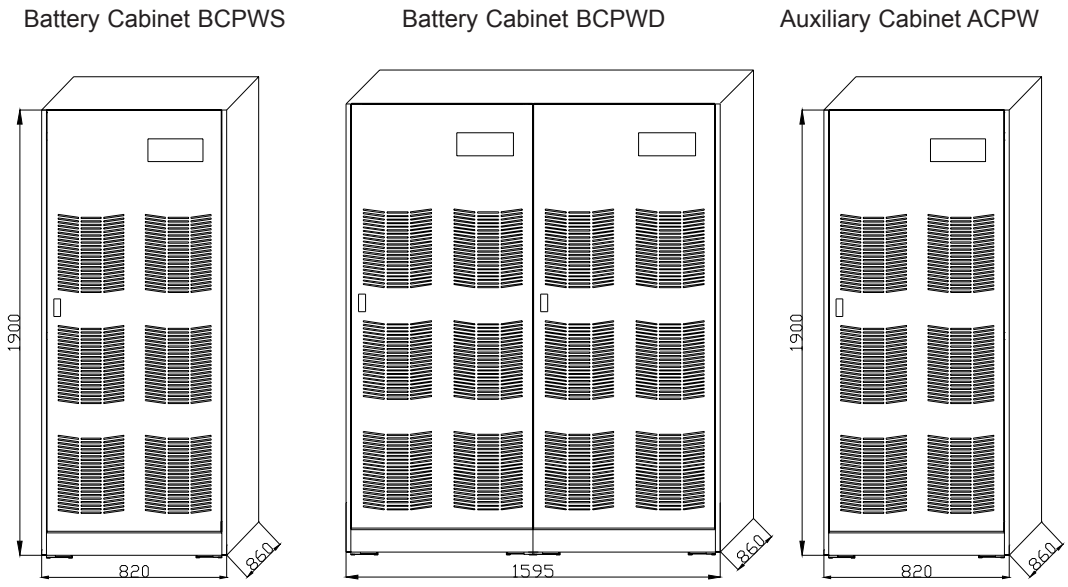


Figure 3. Battery cabinets & auxiliary cabinets for 160-250kVA UPS

The main considerations in planning the UPS system are:

- The UPS output power rating shall be specified according to the total power demand of the protected system. Some margin should be allowed for potential expansion of the protected system, and for possible inaccuracy in calculating or measuring the actual power requirement.
- The battery shall be sized according to the desired backup time. Note that the backup time is longer if the load is less than the nominal power rating of the UPS.

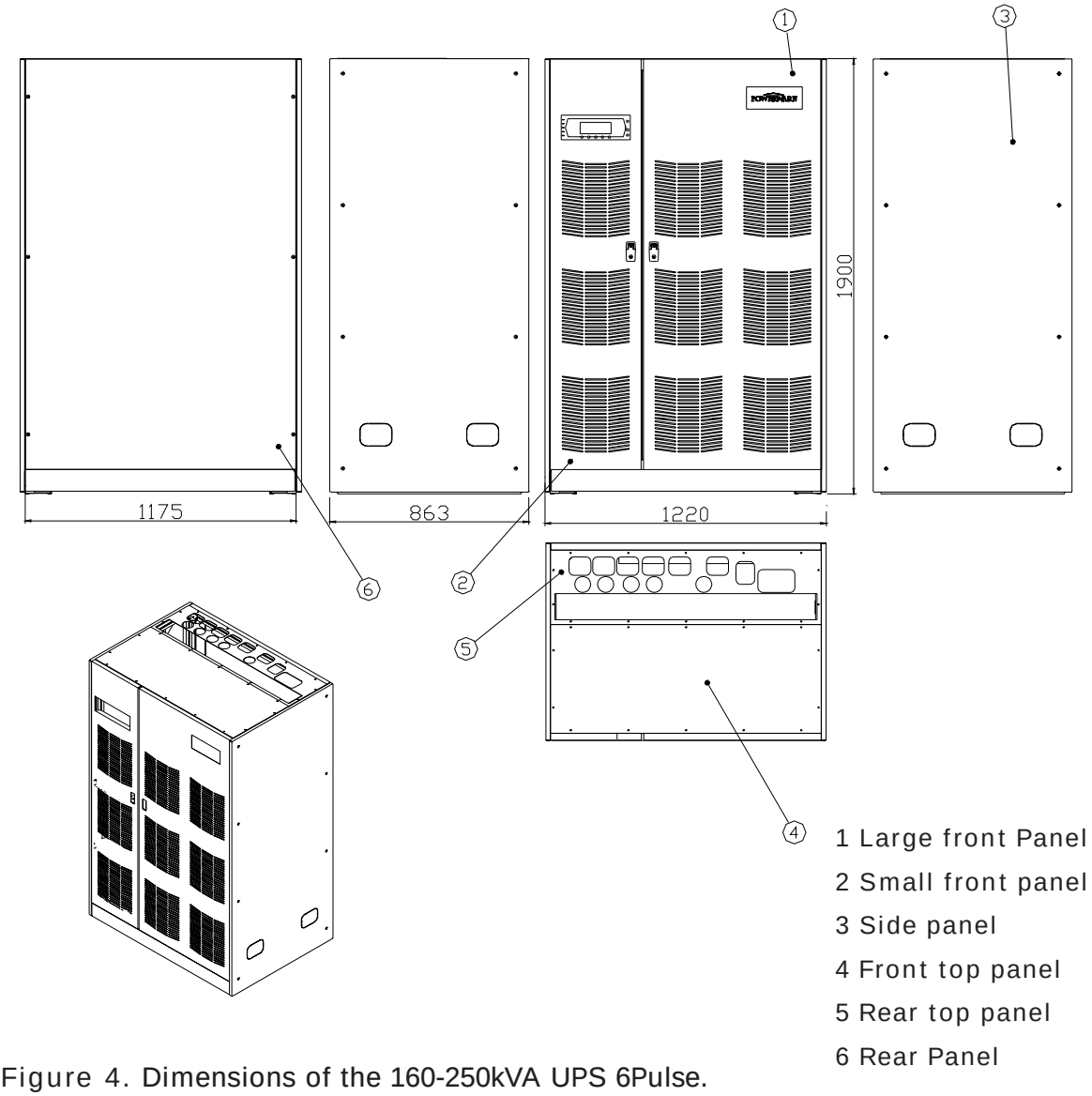


Figure 4. Dimensions of the 160-250kVA UPS 6Pulse.

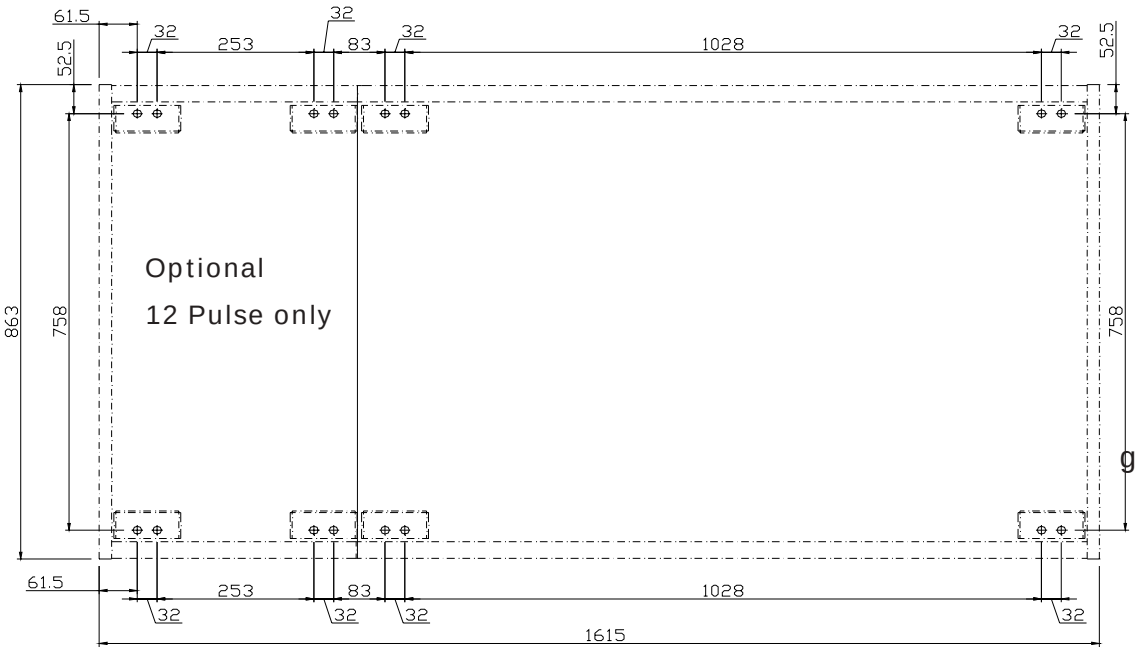
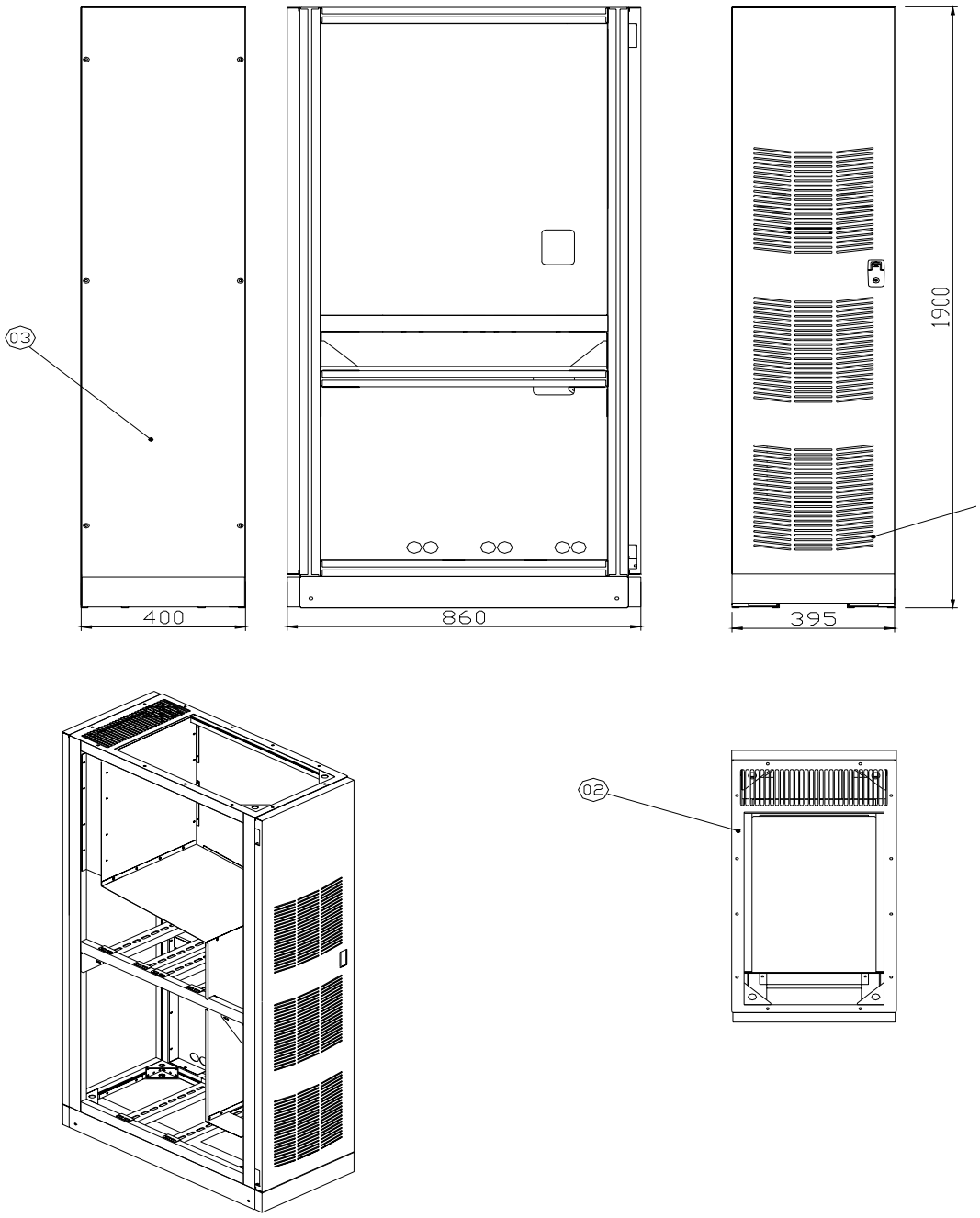


Figure 5. Base Plant for 160-250kVA UPS 6 Pulse & 12 Pulse.

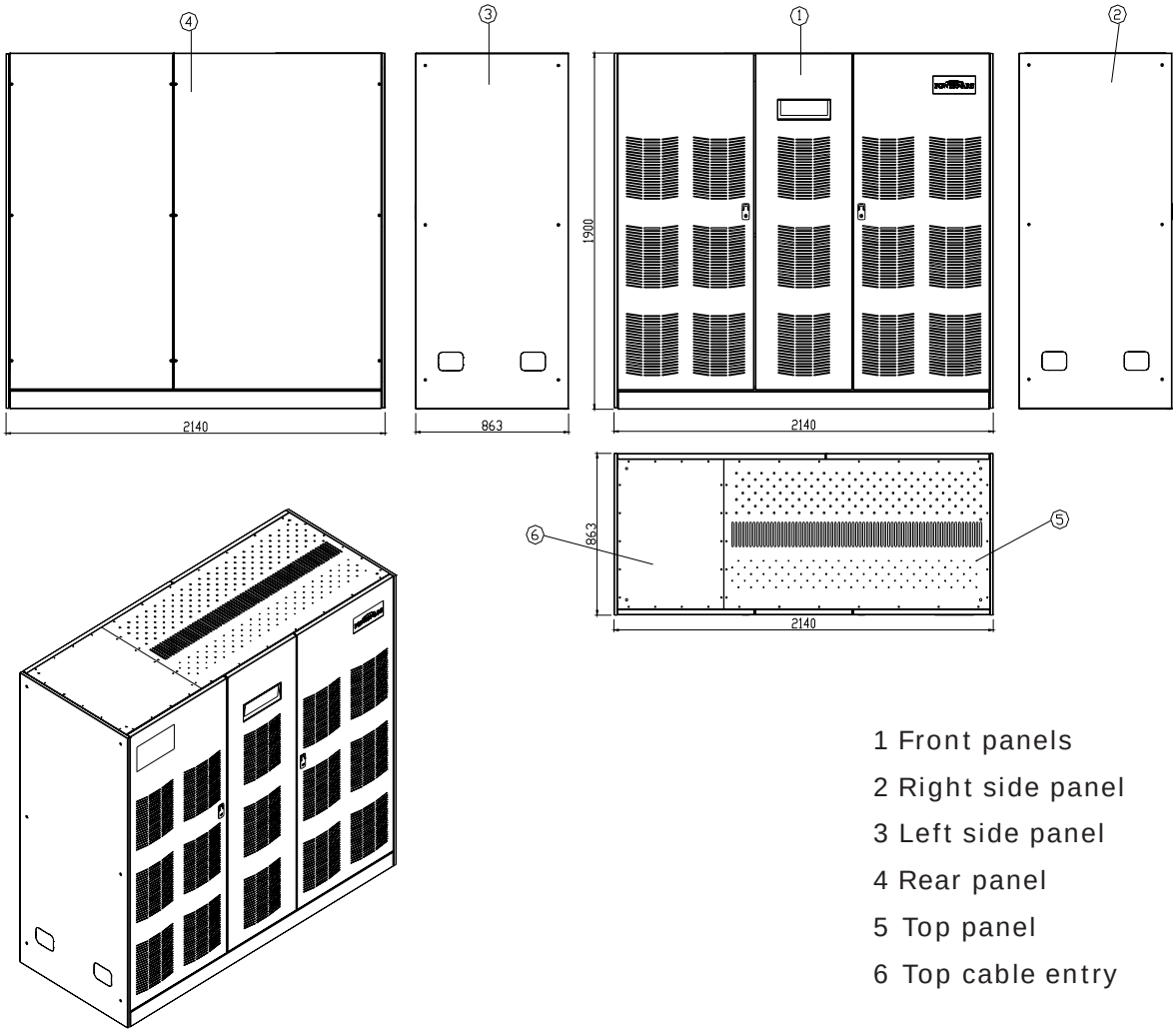


1 Front door

2 Top panel

3 Rear panel

Figure 6. Dimensions of 12 Pulse Extention Cabinet for 160-250kVA UPS.



1 Front panels
2 Right side panel
3 Left side panel
4 Rear panel
5 Top panel
6 Top cable entry

Figure 7. Dimensions of 400-500kVA UPS.

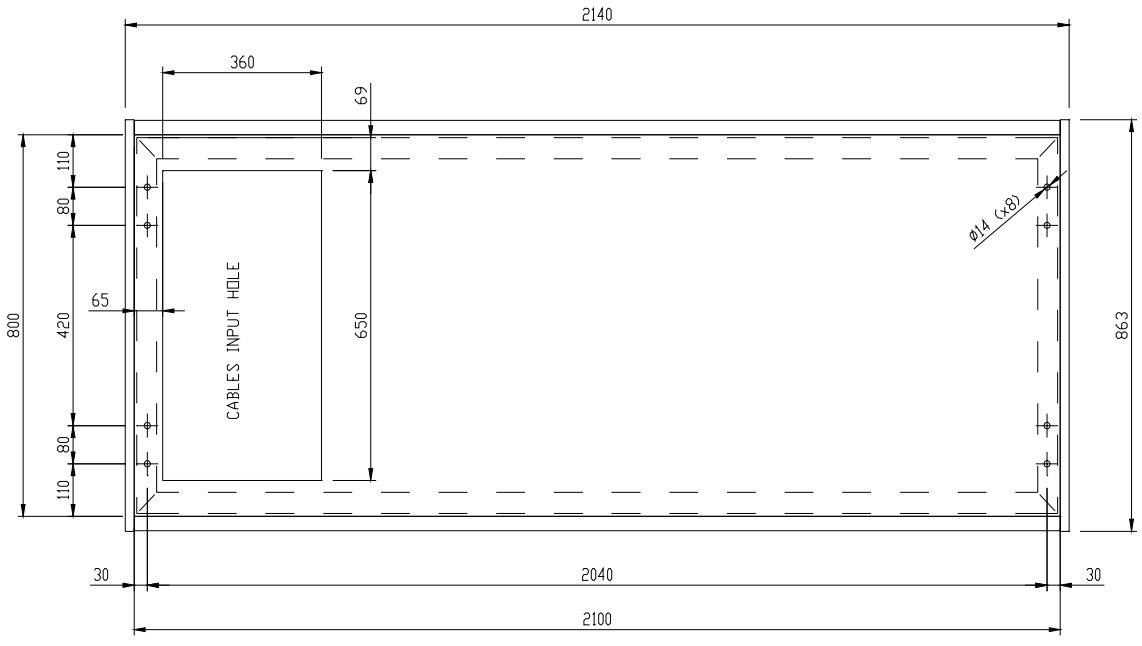


Figure 8. Base Plant for 400-500kVA UPS

Options

The options are used to tailor the solution to the site and load requirements of the installation.

The following options are available:

- External battery cabinets
- External bypass isolation transformers
- 12 Pulse Rectifier without galvanic isolation (standard for 400-500kVA UPS)
- 12 Pulse rectifier and XI & XIII harmonic THD filter
- External Maintenance Bypass (2 switches)
- External Maintenance Bypass (3 switches)
- External Battery Breakers
- Remote and multilingual ViewUPS display panel
- RS-232 communication adapter (xslot)
- SNMP/Web communication adapter (ConnectUPS)
- AS/400 relay adapter (xslot)
- Modem board (xslot)
- Modbus/Jbus communication adapter (xslot)
- Top cable entry (standard for 400-500kVA UPS)
- Backfeed protection
- ABM

3. Safety information

Since the UPS system operates on line power and contains a bank of high-current backup batteries, the information in this chapter is important to all personnel involved.

3.1 Storage and transportation

Because of the heavy weight of the cabinets and the high energy battery bank the equipment must be handled with care. The UPS must always be kept in the position marked on the package and must not be dropped.

3.2 Installation

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a safety hazard. Do not place the UPS in an airtight room.

The UPS system must be installed according to the instructions in this manual. Installation may be performed by qualified personnel only. Failure to recognise the electrical hazards could prove fatal.

WARNING!

Do not open the UPS or battery cabinet. Some components inside the cabinets carry high voltages. To touch them may prove fatal. All operations inside the cabinets must be carried out only by a service engineer from the manufacturer or from an agent authorised by the manufacturer.

3.3 User operations

The only user operations permitted are:

- Starting up and shutting down the UPS unit (not the initial start up).
- Operating the user interface.
- Connecting data interface cables.
- Monitoring the UPS with the software provided.

These operations must be performed according to the instructions in this manual. During any of these operations, the user must take greatest care, and perform only the prescribed operations. Any deviation from the instructions could be dangerous to the operator.

4. Shipping and handling

The UPS equipment is shipped on specifically designed pallets so that it is easy to move with a forklift or pallet jack.
Do not stack the pallets.

Because of the sensitive electronics and high energy stored within batteries, the UPS and the battery cabinet must be handled with care. The UPS and battery cabinet must always be kept in an upright position and must not be dropped.

Because of the heavy weight of the UPS system proper provision must be made for transportation. See technical specifications for dimensions and weights of the UPS.

If the UPS is not immediately installed the following must be remembered:

- The UPS should be stored in the original packing and shipping carton.
- The **recommended** storing temperature is between +15°C ... +25°C.
- The equipment must always be protected from dust, moisture and weather.

If the UPS is stored for a long period of time, the batteries of the UPS should be charged for at least 8 hours every 6 months to maintain the battery condition.

4.1 Unpacking and incoming inspection

Unpack the equipment and remove all the packing materials and shipping cartons.

- The equipment must be inspected for damage after shipment. If damage has occurred during transit, all the shipping cartons and packing materials should be stored for further investigation. If the damage is visible a claim for shipping damage must be filed immediately. Note: Check the shock/tilt indicator.

To file a claim for shipping damage:

- The carrier must be informed within 7 days of receipt of the equipment.

Remove the equipment from the pallet according to figure 9.

The equipment must be checked against the packing list to verify that the shipment is complete.

UPS 160-250kVA **UPS 400-500kVA**

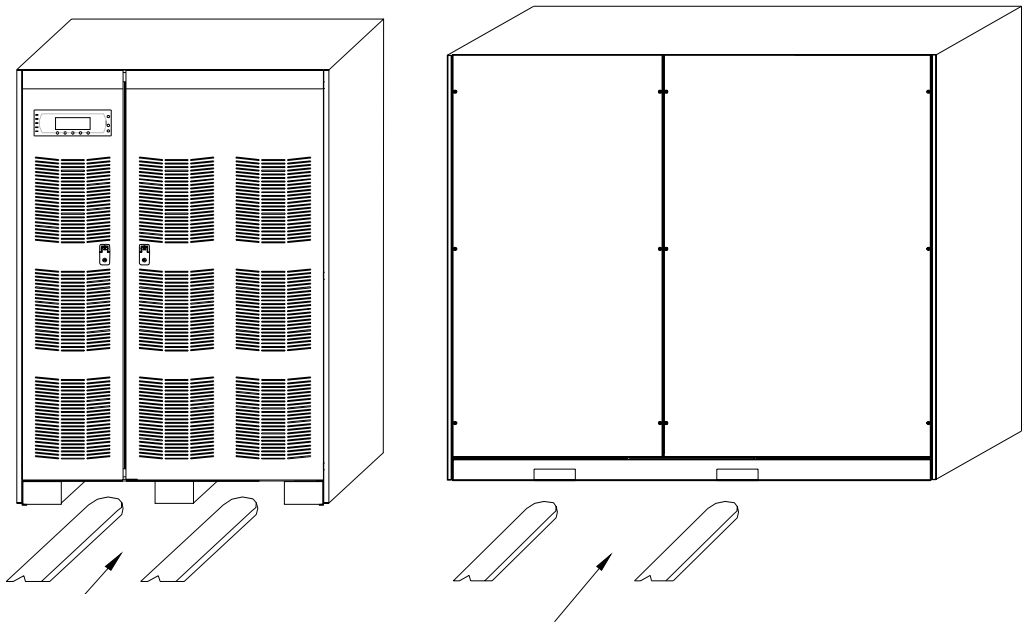


Figure 9. Removing the UPS from a pallet.

Note: The 400-500 kVA UPS should be be forked from the rear side where the unit is heavier, it can be also forked from the right side if a long fork is used.

The UPS is thoroughly inspected at the factory. If there is no damage or discrepancies, the installation may proceed.

4.2 Moving

The UPS units can be moved with fork lift or pallet jack. Because the UPS is heavy, it should be verified that surfaces on which it is moved are strong enough.

5. Installation

The UPS unit is designed with all vital parts accessible from front. All cables and protective fuses must be dimensioned according to local regulations.

5.1 Environment

All the requirements concerning environment described in this chapter (Installation) or “Technical specifications” chapter must be met. If they are neglected the manufacturer cannot guarantee the safety of personnel during installation or use, or that the unit will function properly.

When locating the UPS system and the battery options, the following points have to be remembered:

- Avoid temperature and humidity extremes. To maximise the life time of the batteries, an ambient temperature of 15°C to 25°C is recommended.
- Provide shelter from the elements (especially moisture)
- The UPS can be mounted against the wall. No space is required at rear or sides of the UPS. Always leave 500 mm free space above the UPS. Always leave enough space in front of the UPS (minimum 1 meter) for service and maintenance. See figure 10.
- The batteries should preferably be installed next to the UPS. The right side is recommended due to the power cable fastening, an opening is provided on the right panel of the UPS and on the left panel of the battery cabinet for cabling (see “External Battery Cabinet Installation” chapter).

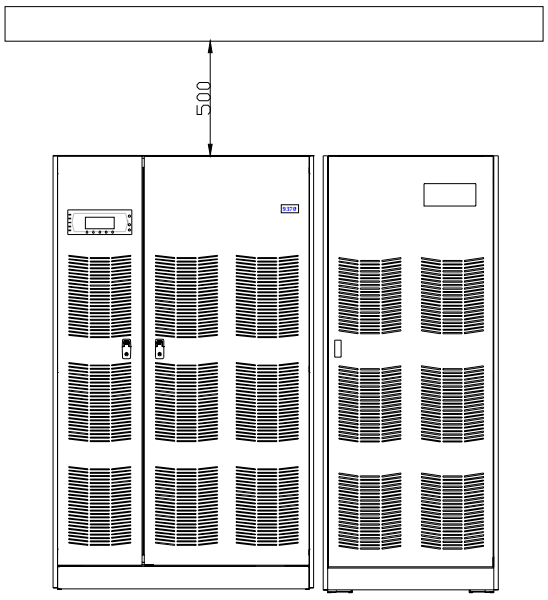


Figure 10. Ventilation and space requirements for 160 - 500 kVA UPS.

5.2 Floor loading

When planning the installation the floor loading must be taken into consideration because of the heavy weight of the UPS and battery cabinets.

The strength of the installation surface must be adequate for point and distributed loadings given in table 1.

Description	Weight (kg)	Point loading (kg/cm^2)	Distributed loading (kg/m^2)	Dimensions WxDxH
160-250 kVA UPS 6 Pulse	1130	1,8	1077	1220x860x1900
160-250 kVA UPS 12 Pulse	1820	1,4	1306	1620x860x1900
160-250 kVA UPS 12 Pulse & THD Filter	1910	1,5	1370	1620x860x1900
400-500 kVA UPS	2880	1,2	1564	2150x860x1900
THD Filter (for 400-500 kVA UPS)	390	-	-	-
ABM 160-250 kVA UPS option	15	-	-	-
ABM 400-500 kVA UPS option	16	-	-	-
Top cable entry option for 160-250 VA UPS	35	-	-	-
BCPWS Battery cabinet (*)	210 (*)	(**)	(***)	818x860x1900
BCPWD Battery cabinet (*)	410 (*)	(**)	(***)	1596x860x1900

Table 1. The UPS floor loading of UPS modules and external options.

(*) The weight is referred to the empty cabinet: add the weight of the battery.

(**) To calculate point loading (kg/cm^2) add the weight of the cabinet to the weight of the batteries and divide by 640 for BCPWS and 1280 for BCPWD.

(***) To calculate distributed loading (kg/m^2) add the weight of the cabinet to the weight of the batteries and divide by 0.7 for BCPWS and 1.4 for BCPWD.

5.3 Power connections

The electrical planning and the UPS installation must be done by qualified personnel only. All power connections shall be done with cable lugs.

WARNING!

The UPS contains high voltage and current which can injure or kill personnel and damage equipment.

The customer has to supply the wiring to connect the UPS to power lines.

The installation inspection and initial start up of the UPS and extra battery cabinet must be carried out by a service engineer from the manufacturer or from an agent authorised by the manufacturer.

The UPS unit has the following power connections:

- 3-phase and PE connection for rectifier input
- 3-phase and N and PE connection for bypass input
- 3-phase and N and PE connection for load output
- +, - and PE connection for batteries

Note: PE connection is provided on a copper ground bar

All input and output wiring of the UPS connects to the terminals located behind the cover plates behind the doors.

The UPS is provided with a single phase L-N power outlet protected with a 10A fuse.

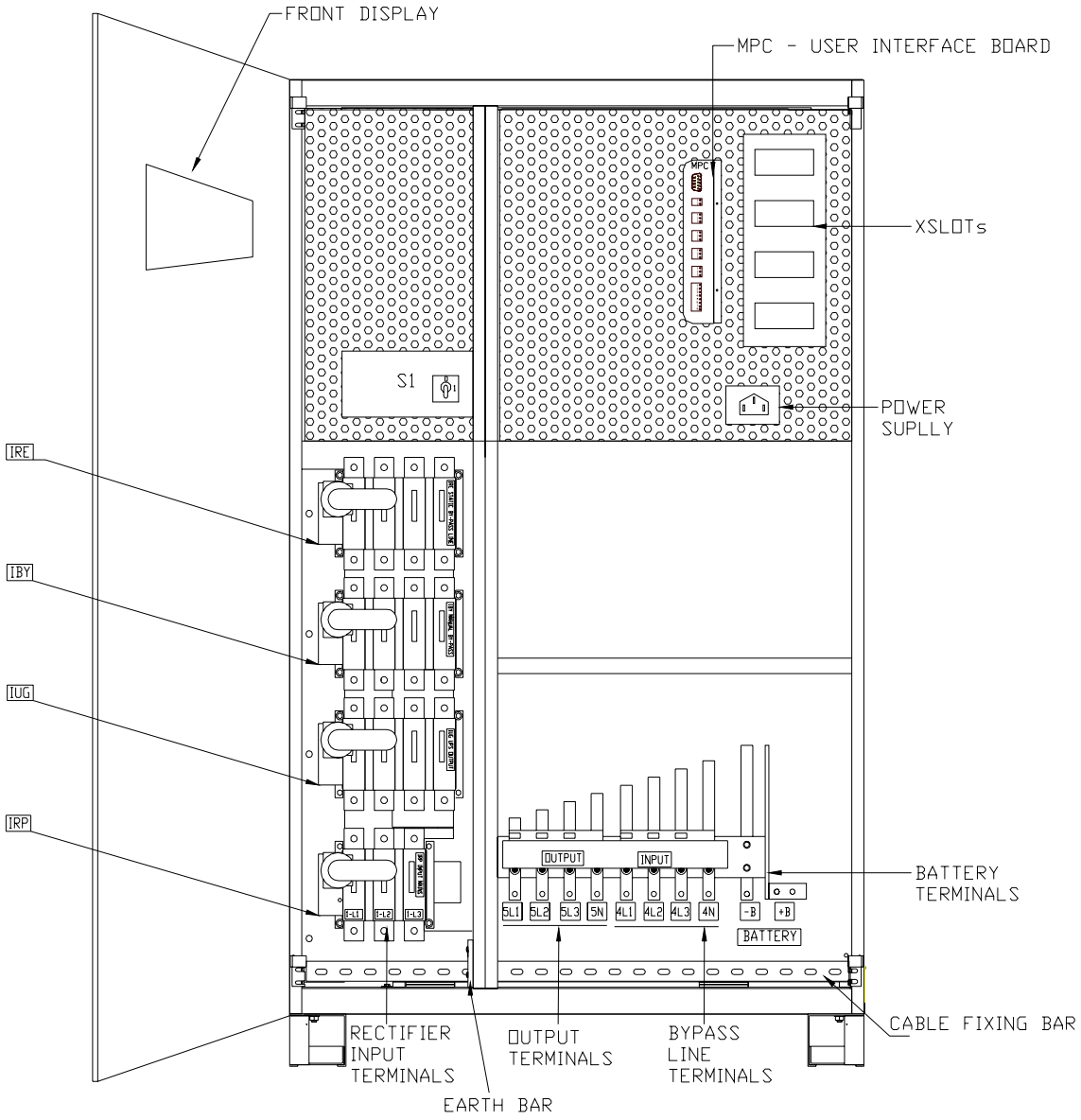


Figure 11. UPS 160-250kVA std 6 Pulse - location of electrical components.

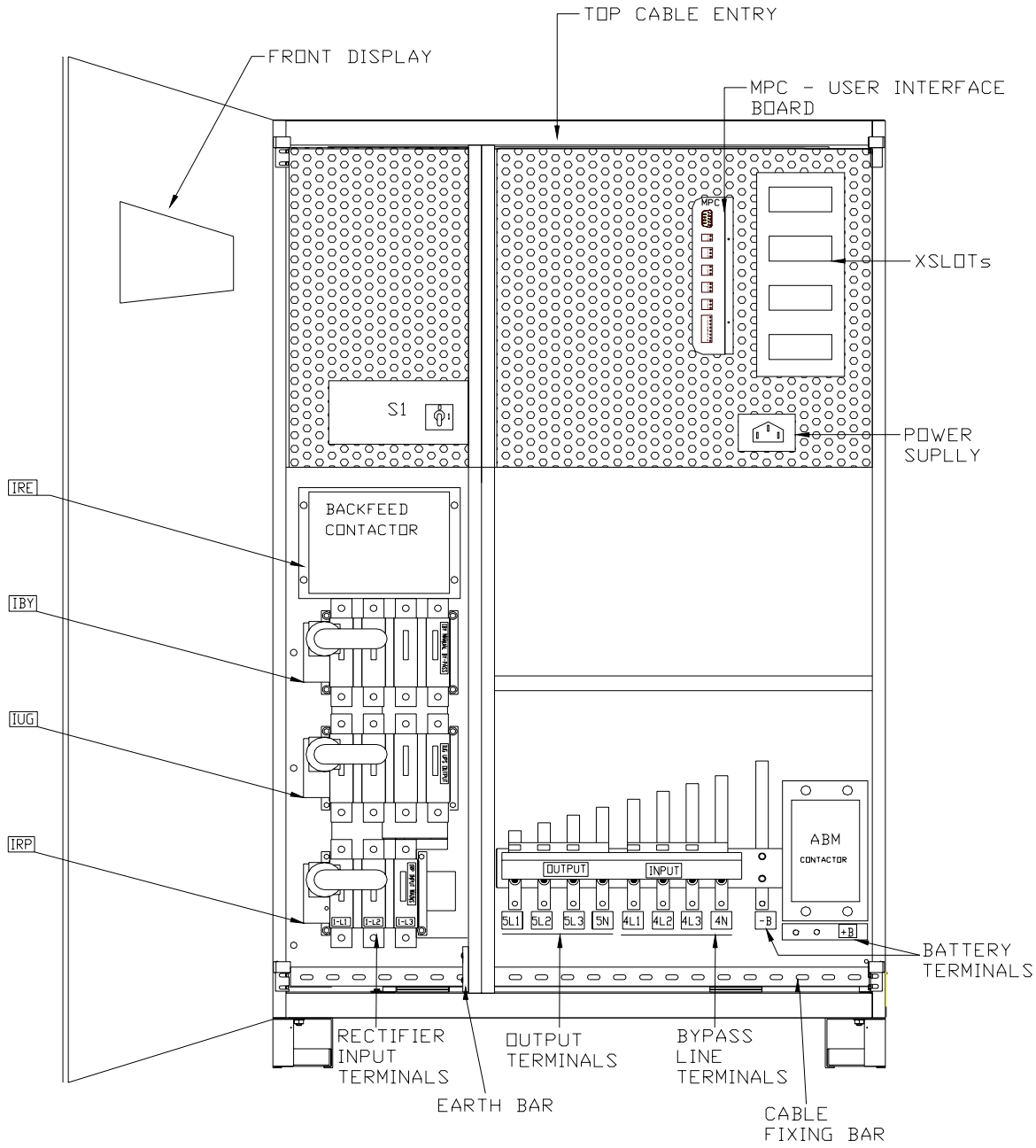


Figure 12. UPS 160-250kVA 6 Pulse (full features) - Location of electrical components.

Figure 13. UPS 160-250kVA 12 Pulse & THD optional Filters

Intelligent THDI reduction and PF improvement. The load is continuosly monitored with filter disconnection if load is <25% and overcurrent protection.

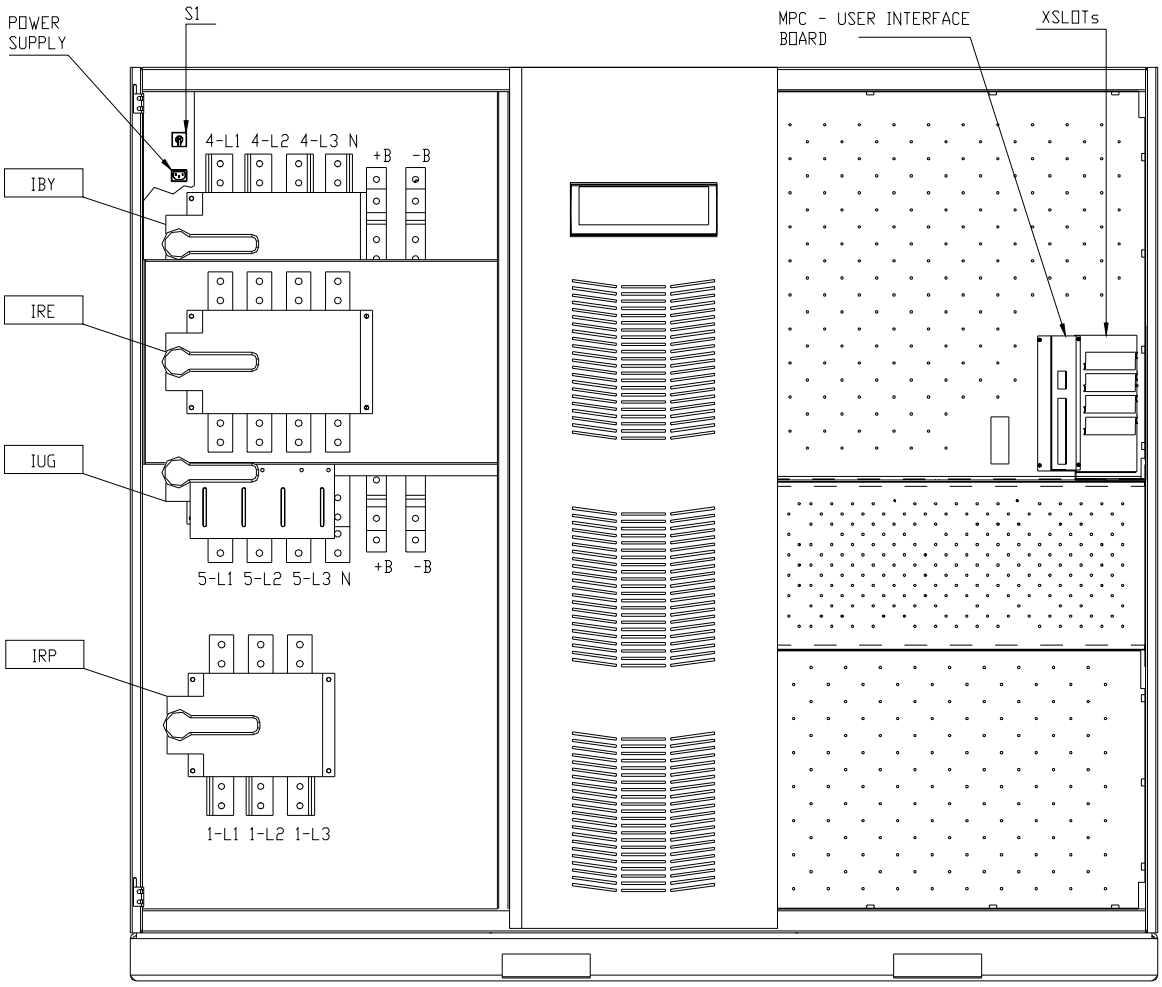


Figure 14. UPS 400-500kVA std - location of electrical components.

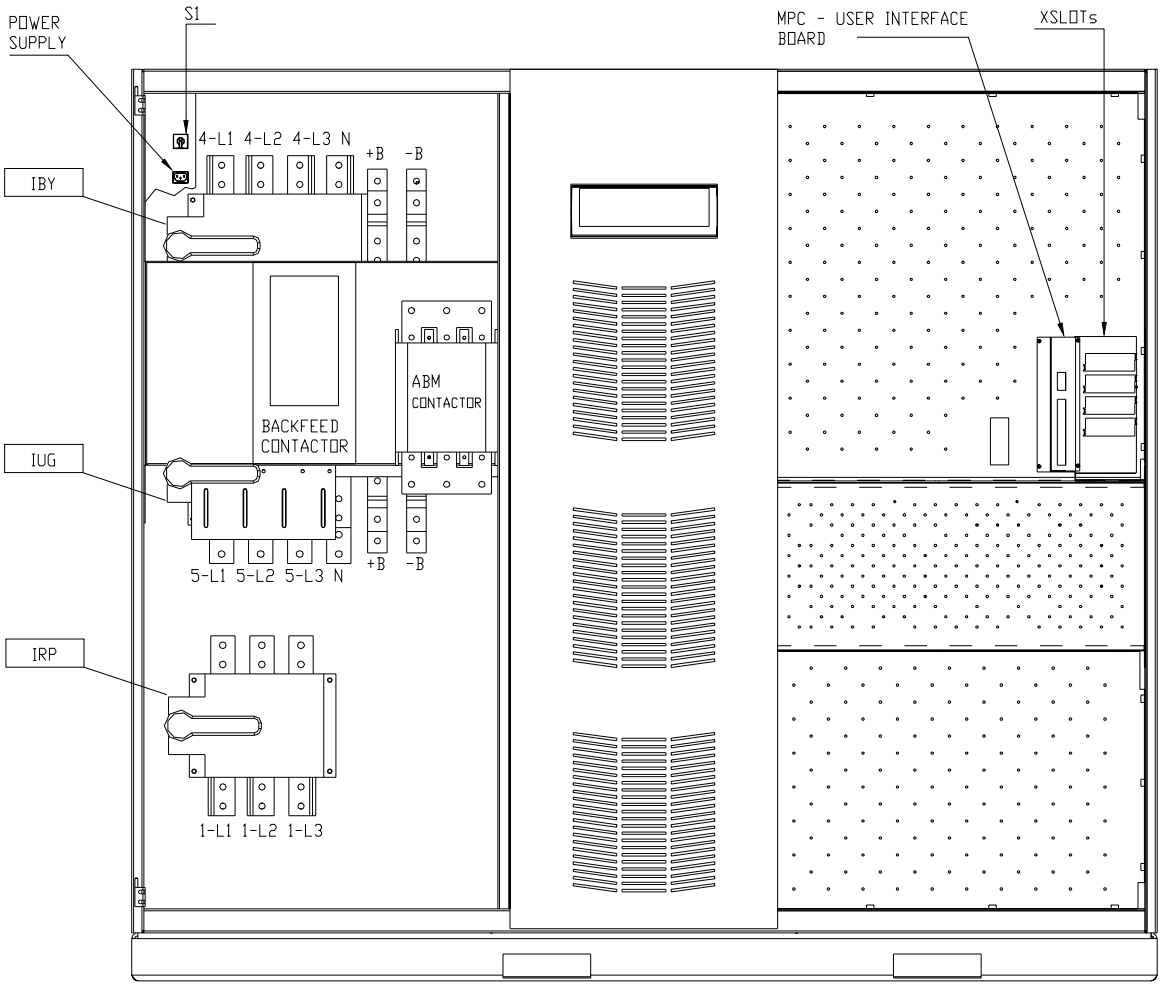


Figure 15. UPS 400-500kVA full features - location of electrical components.

5.4 Information about power terminals

Fastening torques for terminals depend on type of cable shoes and materials. If using aluminium shoes, please use anti-oxydizing paste in the connections. The UPS has bolts for the power connections. Please check the local safety rules for the installation when designing the cables:

Bottom Cable Entry Terminal for 160-250kVA UPS:

Rectifier input

Flat copper bar 40*5mm	Bolt M12

Bypass input/UPS Output

Flat copper bar 30*8mm	Bolt M12
Neutral	Bolt M12

Ground

Flat copper bar 40*5mm	Bolt M12

Battery Input

Flat copper bar 40*8mm	Bolt M12

Top Cable Entry Terminal for 160-250kVA UPS:

Rectifier input

Flat copper bar 80x40*5mm	Bolt M12

Bypass input/UPS Output

Flat copper bar 80x40*5mm	Bolt M12
Neutral	Bolt M12

Ground

Flat copper bar 50*8mm	Bolt M12

Battery Input

Flat copper bar 50*8mm	Bolt M12

Cable Entry Terminal for 400-500kVA UPS:

Rectifier input

Flat copper bar 255x80*6mm	Bolt M12

Bypass input

Flat copper bar 255x80*6mm	Bolt M12
Neutral	Bolt M12

UPS Output

Flat copper bar 400x80*6mm	Bolt M12

Ground

Flat copper bar 100x80*6mm	Bolt M12

Battery Input

Flat copper bar 40*8mm (x2)	Bolt M12

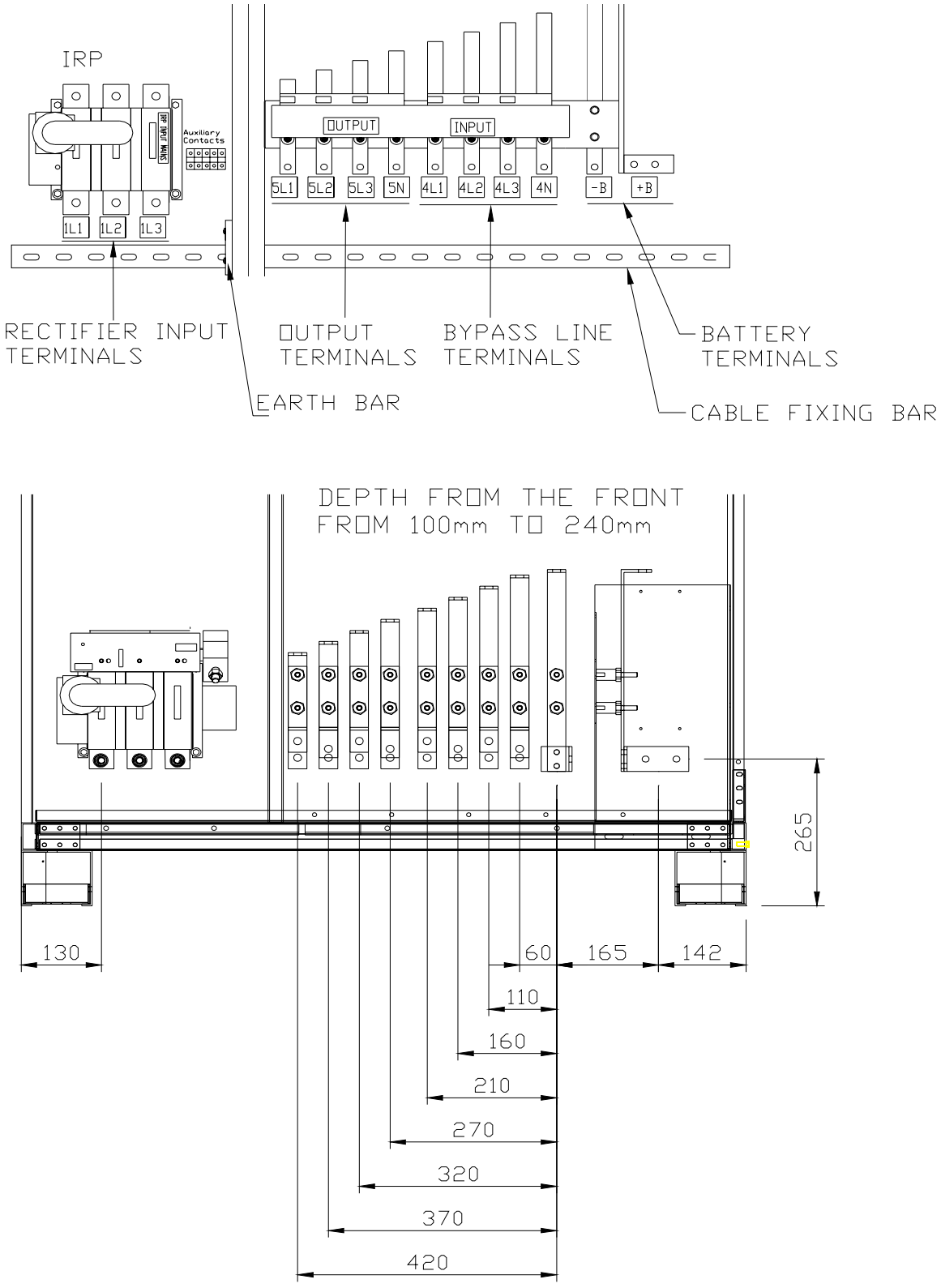
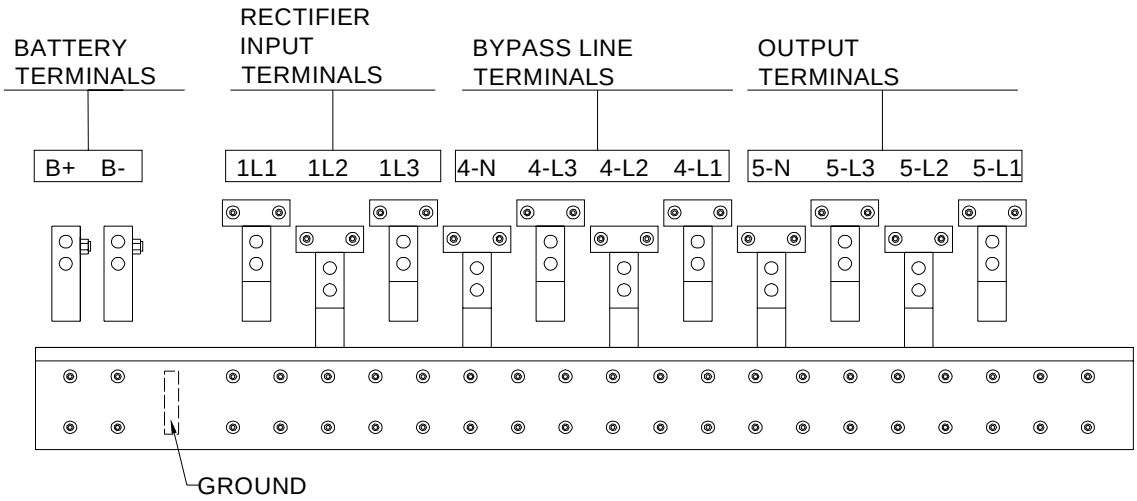


Figure 16. Bottom Cable Entry Terminal for UPS 160-250kVA



REAR VIEW

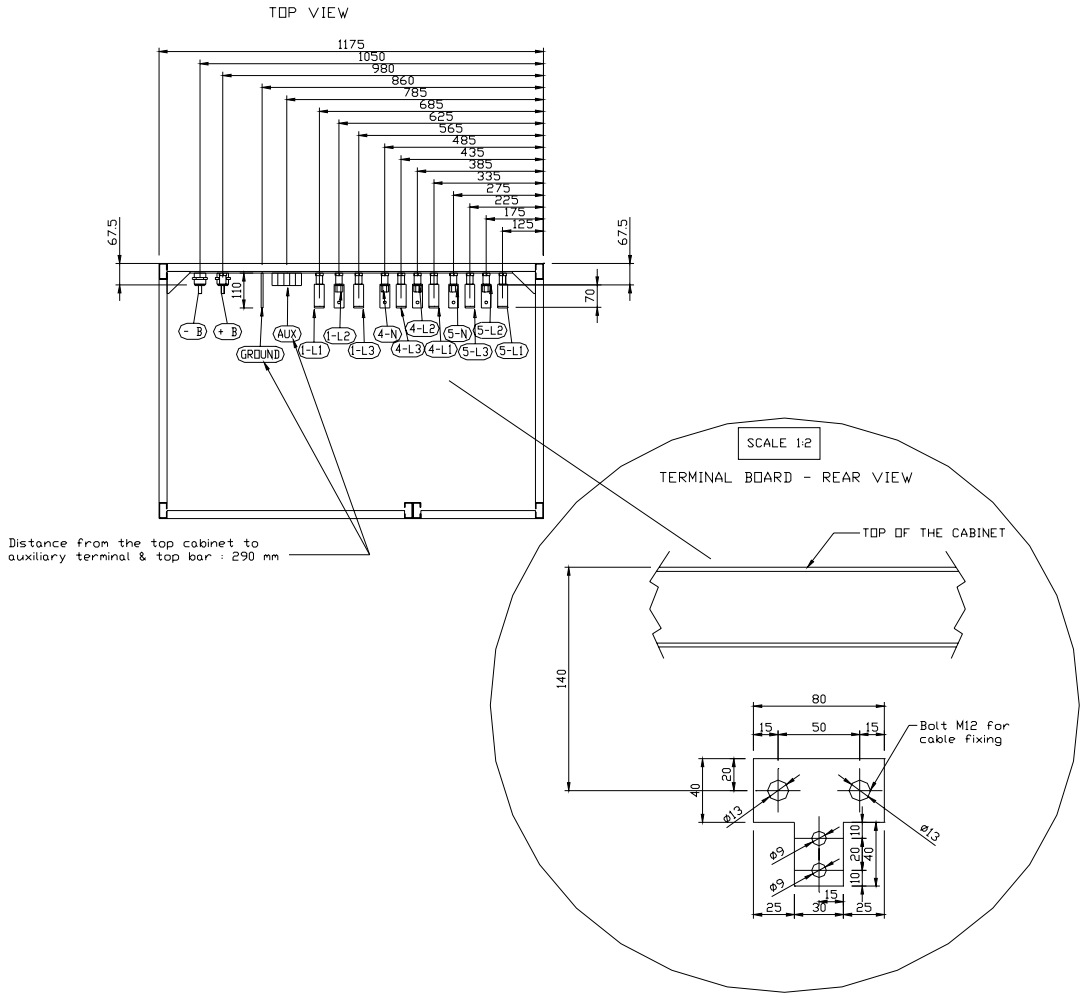


Figure 17. Top Cable Entry Terminal for UPS 160-250kVA

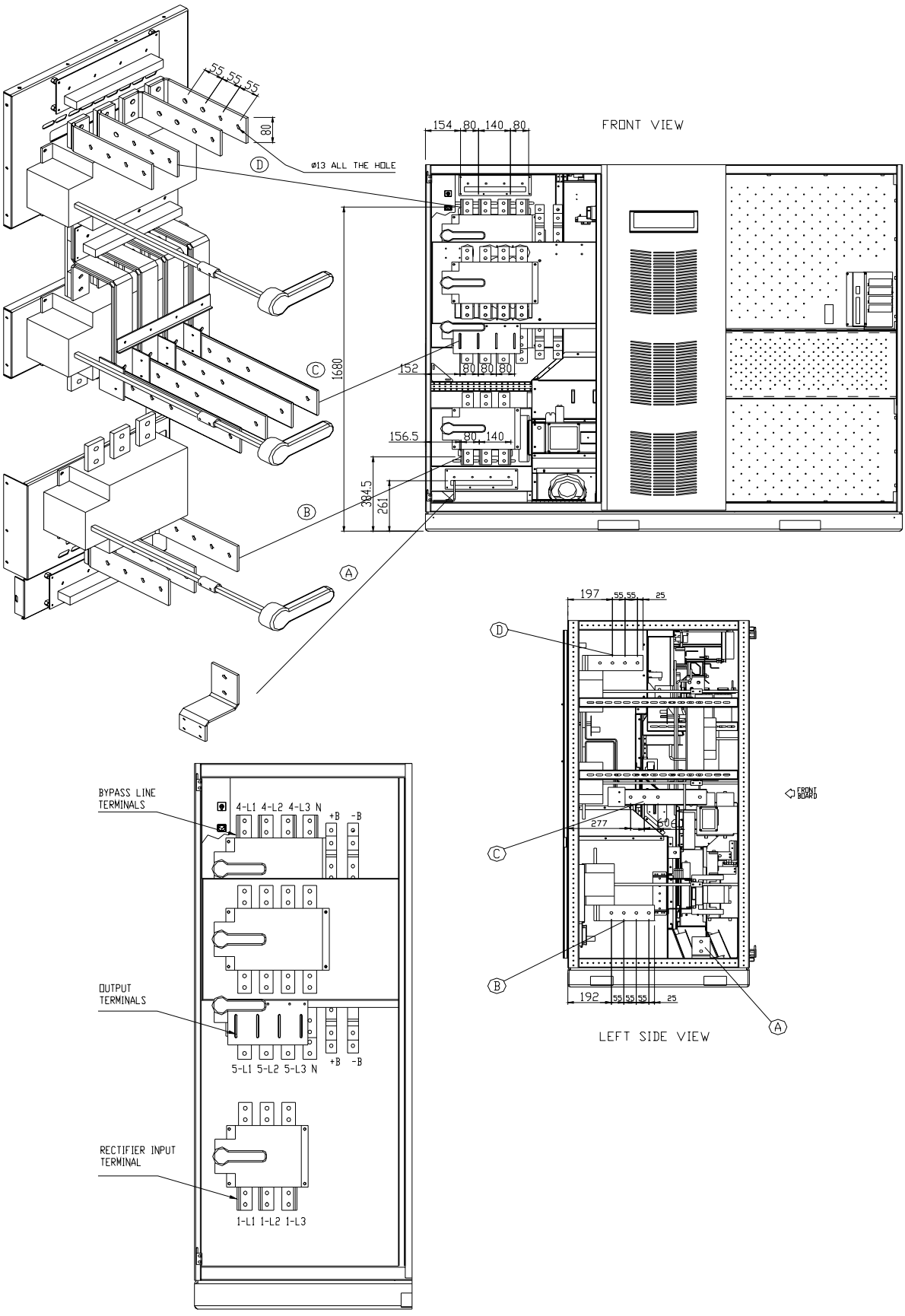


Figure 18. Cable Entry Terminals for UPS 400-500kVA STD

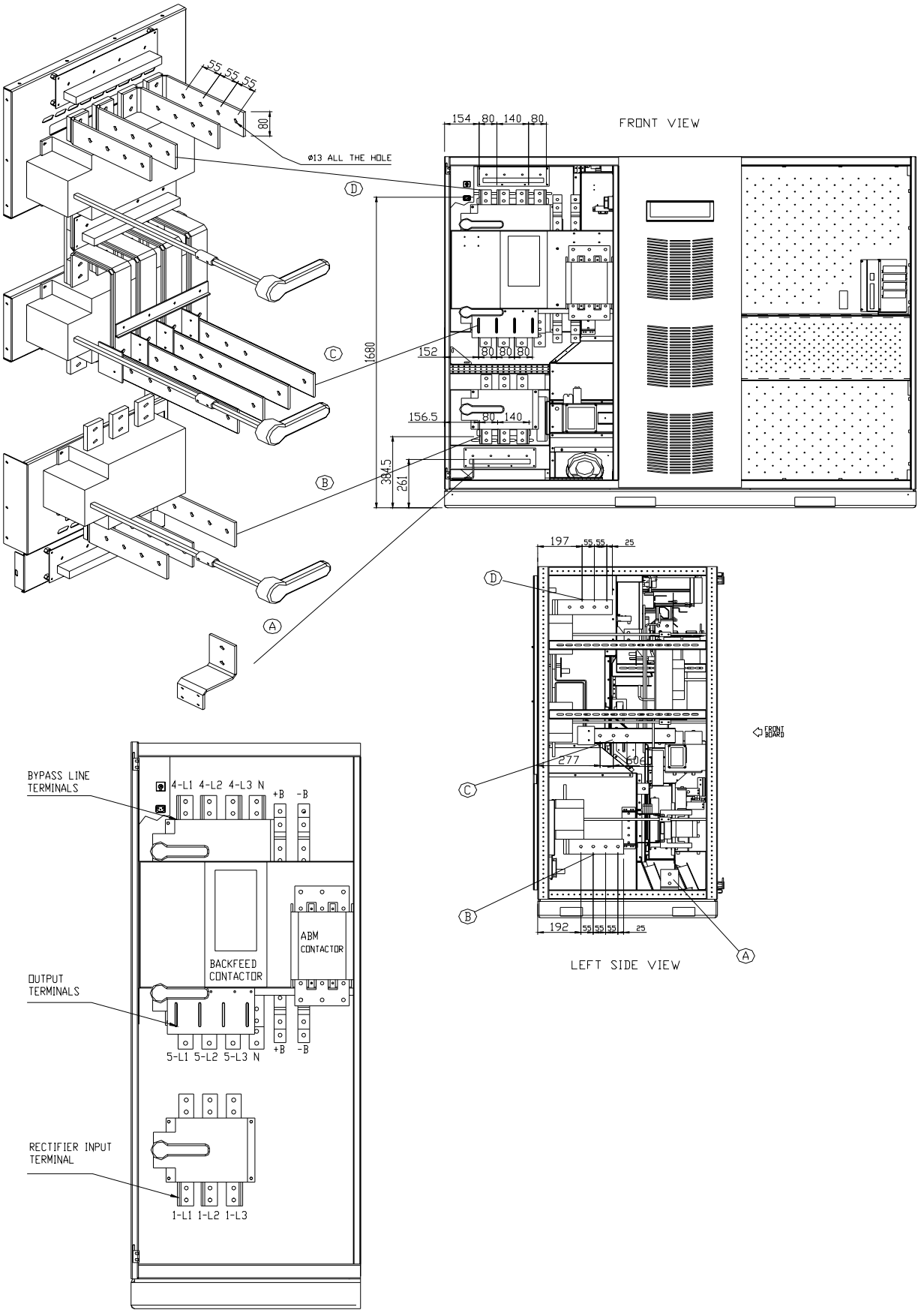


Figure 19. Cable Entry Terminals for UPS 400-500kVA full features

5.5 Mains and load connections

The proper connection order is as follows:

1. Switch off the supply to the distribution point to which the UPS unit is to be connected.

2. For extra safety, also remove the fuses from the selected lines**.**
   Make absolutely sure with measurement that there is no power.

3. A readily accessible disconnect device must be incorporated in all fixed input wiring. The disconnect device shall have a contact separation of at least 3 mm.

4. Check that electrical connections to the installation site have been properly executed. Also check fuse or circuit breaker ratings and cable dimensions against tables 2or 3for 160-500 kVA systems.

5. The UPS should be connected in accordance with figures 20 and 21.

6. If singlefeed installation is required, the interconnection cables between the 2 inputs must be provided by the customer.

7. Connect input cables and output cables to the UPS.
   Neutral is requested on the bypass input.

8. Make sure that the UPS unit output cable is connected to the load.

9. Connect the battery to the UPS: power cables to terminals +B, -B. Connect C1,C2 (n.o auxiliary contact) to terminals XA5, XA4 and C3,C4 (shunt trip) to XA1, XA3. If multiple battery cabinets are used connect the power cables in parallel to +B,-B, all shunt trip coils in parallel to XA1, XA3 and connect in parallel the auxiliary contacts.

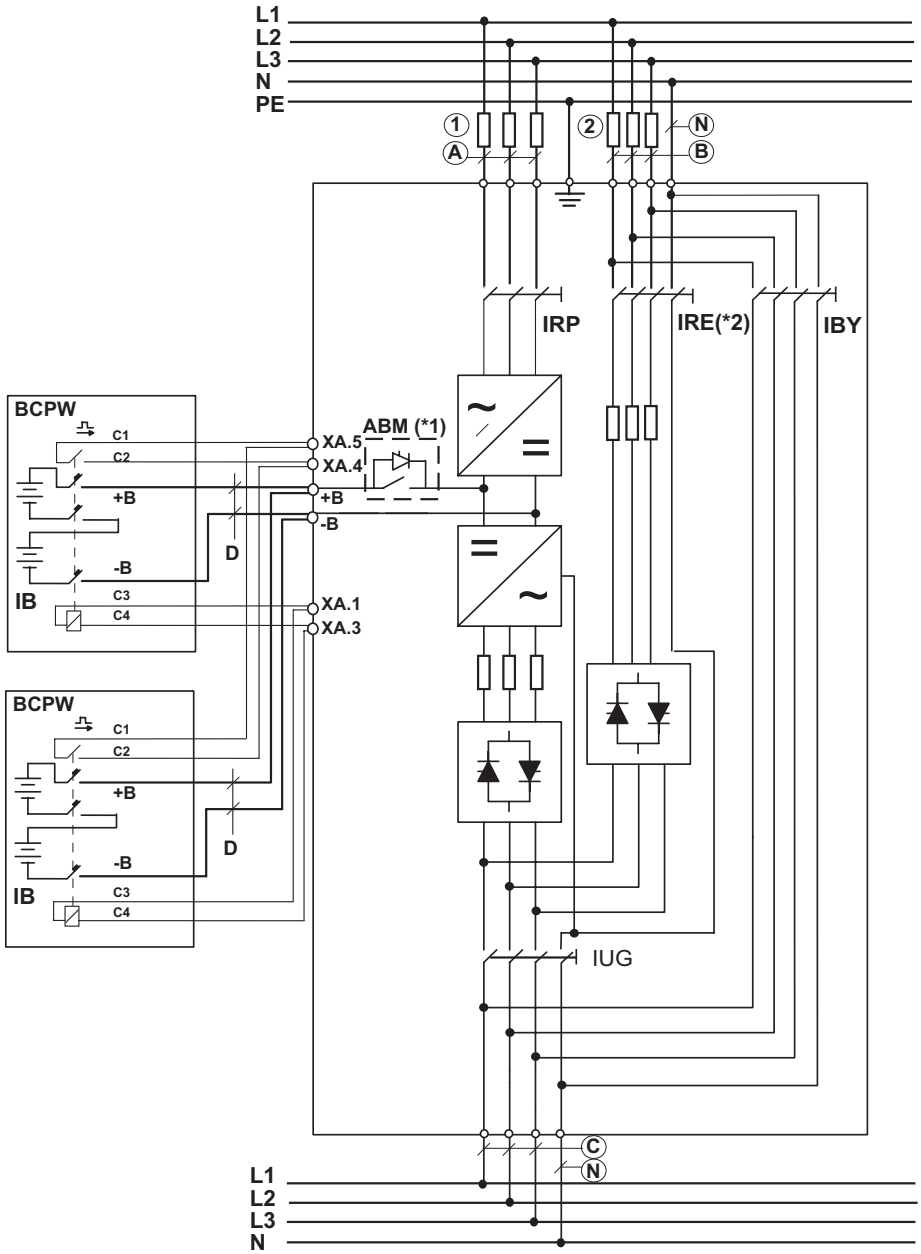
10. Also connect any computer and alarm connections according to chapter 6. These connections are in the user interface area behind the right-hand door.

11. If an external bypass switch will be used, contact your dealer first.

Note: If the battery breaker is not equipped with an auxiliary contact, monitoring of the switch status can be disabled via Service Software.

With shielded power cables, the 9370-500 complies with the limits given in table 3 of EN50091-2. Installation instructions must be issued in order to ensure proper shielding of the power cables in the field: “in order to comply with all the EMC requirements and in particular with the radiated emission limits in accordance to EN50091-2, all power cables must be installed with adequate earthed shield”.

The UPS unit is now connected to the mains and to the load but there is no power.
Make sure that the connections are properly made.



(*1)=ABM Optional
(*2)=IRE is an on load isolator, or backfeed contactor as an option

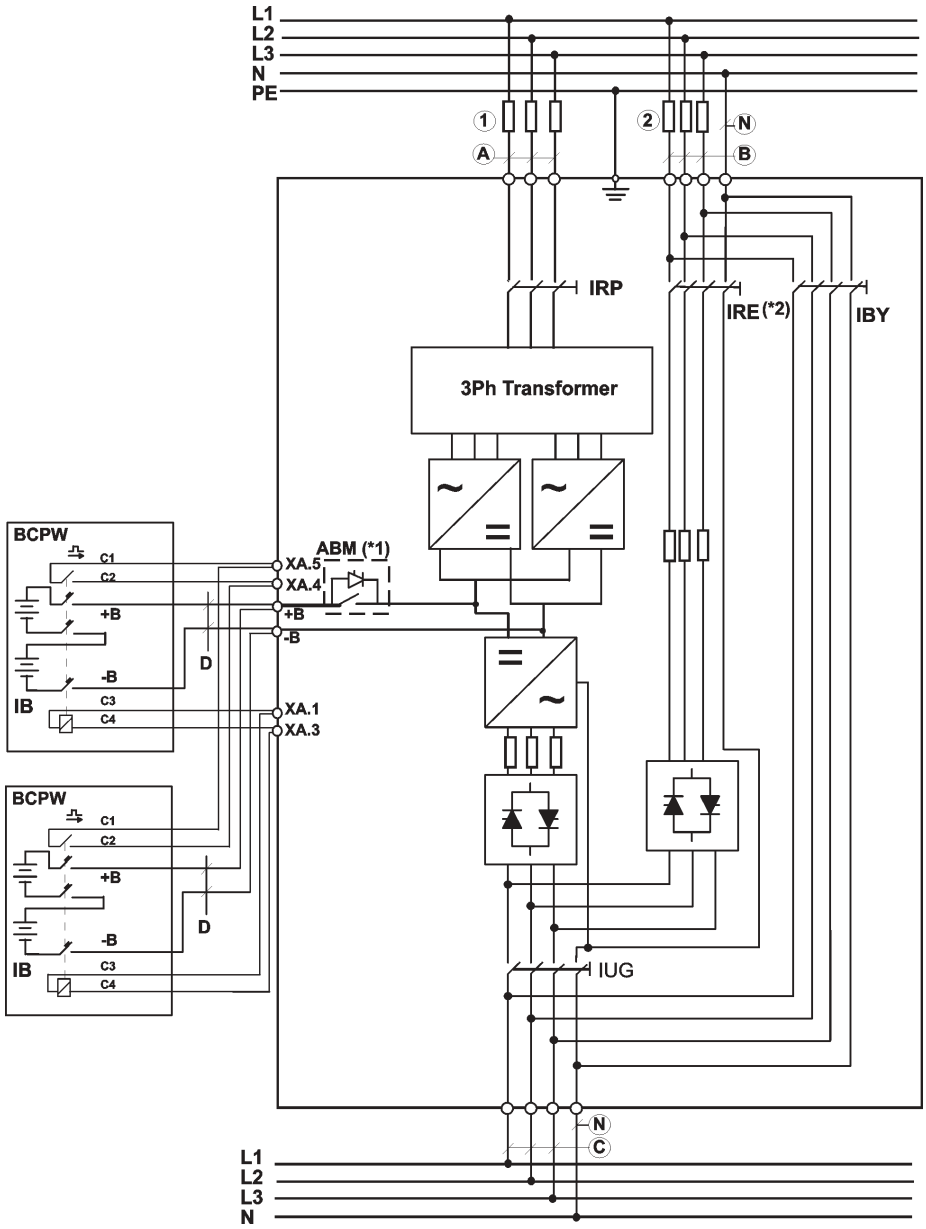
Figure 20. Interconnection of 6 Pulse UPS 160-250 kVA

Power	Fuse 1	Fuse 2	Cable A	Cable B	Cable N	Cable C	Cable D
160 kVA	400 A	400 A	3x2x95 mm²	3x2x95 mm²	1x2x95 mm²	3x2x95 mm²	2x2x120 mm²
200 kVA	400 A	400 A	3x2x120 mm²	3x2x120 mm²	1x2x120 mm²	3x2x120 mm²	2x2x185 mm²
250 kVA	630 A	630 A	3x2x150 mm²	3x2x150 mm²	1x2x185 mm²	3x2x150 mm²	2x2x120 mm²

Table 2. Fuse and cable dimensions for installations of UPS units from 160 to 250 kVA. Note that the fuse numbers and the cable letters refer to the numbers/letters in figure 20. Slow gG/gL fuses should be used to protect cables.

Note: Cable size is for indication only. The cross section (including the PE cable) will depend on insulation temperature rating, cable lenght and local regulations.

Please note that the battery cables delivered with the external battery cabinets are to install the external battery cabinet to the right side of the UPS.



(*1)=ABM Optional

(*2)=IRE is an on load isolator, or backfeed contactor as an option

Figure 21. Interconnection of 12 Pulse UPS.

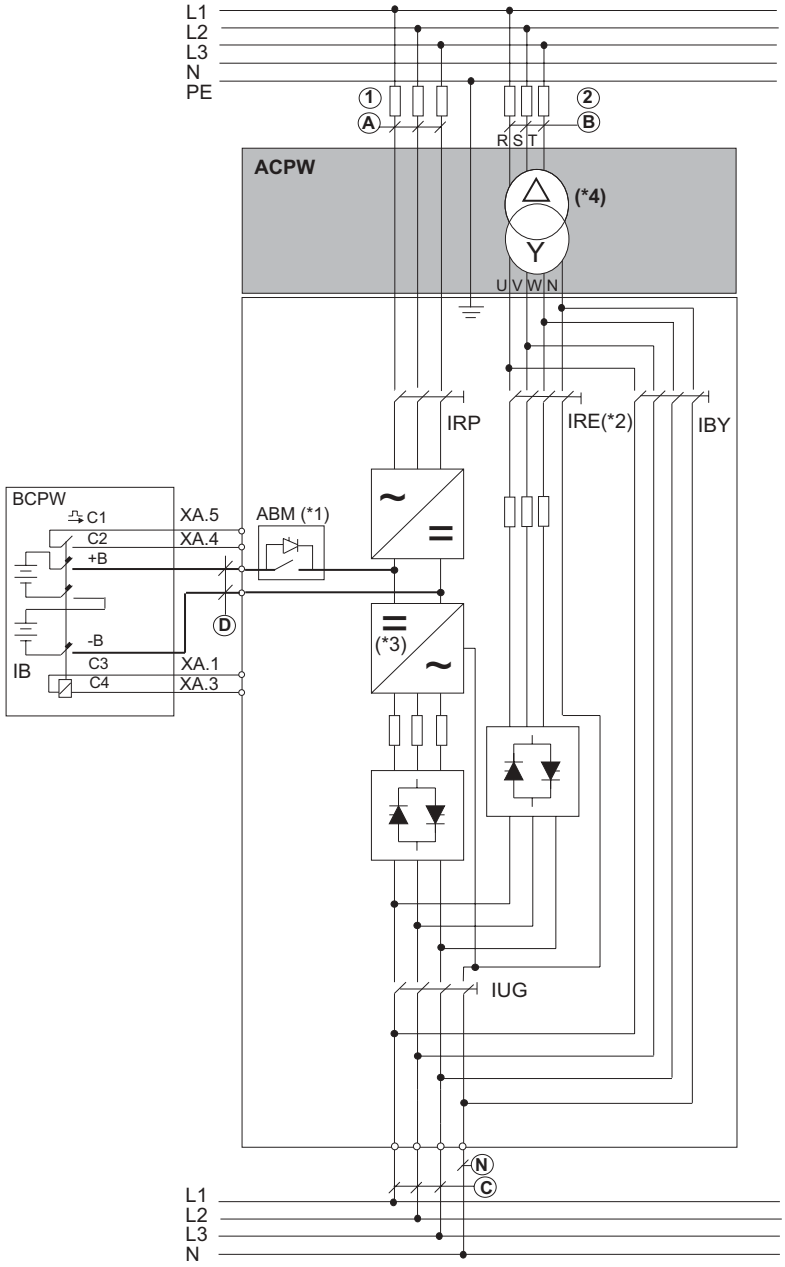
Power	Fuse 1	Fuse 2	Cable A	Cable B	Cable N	Cable C	Cable D
160 kVA	400 A	400 A	3x2x95 mm²	3x2x95 mm²	1x2x95 mm²	3x2x95 mm²	2x2x120 mm²
200 kVA	400 A	400 A	3x2x120 mm²	3x2x120 mm²	1x2x120 mm²	3x2x120 mm²	2x2x185 mm²
250 kVA	630 A	630 A	3x2x150 mm²	3x2x150 mm²	1x2x185 mm²	3x2x150 mm²	2x2x120 mm²
400 kVA	800 A	800 A	3x2x300 mm²	3x2x240 mm²	1x3x240 mm²	3x2x240 mm²	2x3x240 mm²
500 kVA	1000 A	1000 A	3x3x240 mm²	3x3x185 mm²	1x4x185 mm²	3x3x185 mm²	2x3x300 mm²

Table 3. Fuse and cable dimensions for five wire installations of UPS units from 160 to 500 kVA. Note that the fuse numbers and the cable letters refer to the numbers/ letters in figure 21. Slow gG/gL fuses should be used to protect cables.

Note: Cable size is for indication only. The cross section (including the PE cable) will depend on insulation temperature rating, cable lenght and local regulations.

Please note that the battery cables delivered with the external battery cabinets are to install the external battery cabinet to the right size of the UPS.

5.6 Installation of Additional Optional cabinet



Note: (*1)=ABM Optional; (*2)=IRE is an on load isolator, or backfeed contactor as an option; (*3)= Built in inverter transformer; (*4)=The rating of the isolation transformer is limited to 100% of the UPS size

Figure 22. Interc.of UPS with bypass input transformer for input/output isolation.

Power	Fuse 1	Fuse 2	Cable A	Cable B	Cable N	Cable C	Cable D
160 kVA	400 A	310 A	3x2x95 mm²	3x2x95 mm²	1x2x95 mm²	3x2x95 mm²	2x2x120 mm²
200 kVA	400 A	310 A	3x2x120 mm²	3x2x120 mm²	1x2x120 mm²	3x2x120 mm²	2x2x185 mm²
250 kVA	630 A	400 A	3x2x150 mm²	3x2x150 mm²	1x2x185 mm²	3x2x150 mm²	2x2x120 mm²
400 kVA	800 A		3x2x300 mm²	3x2x240 mm²	1x3x240 mm²	3x2x240 mm²	2x3x240 mm²
500 kVA	1000 A		3x3x240 mm²	3x3x185 mm²	1x4x185 mm²	3x3x185 mm²	2x3x300 mm²

Tab.4. Fuse and cable dimensions for installations of UPS units from 160 to 500 kVA.

5.7 External Battery Cabinet Installation

The batteries should preferably be installed next to the UPS. The right side is recommended due to the power cable fastening, an opening is provided on the right panel of the UPS and on the left panel of the battery cabinet for cabling.

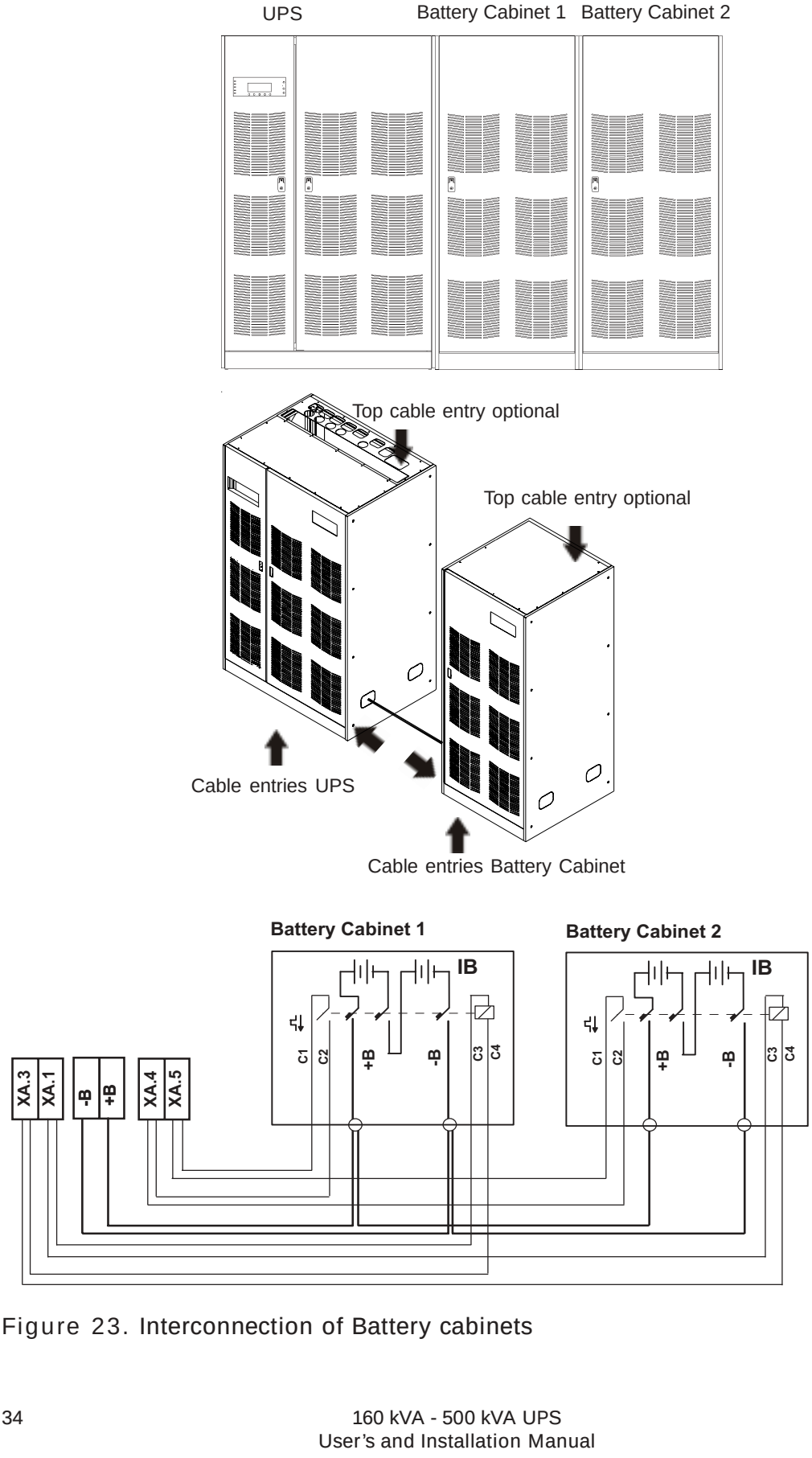


Figure 23. Interconnection of Battery cabinets

BCPWS 1x32/400 Battery Cabinet (32 Monoblocks 12V)

Dimensions:

Height 1900 mm

Width 818 mm

Depth 860 mm

To assemble the battery cabinet:

IMPORTANT: Open the IB battery switch before connecting the cables.

- Remove the screws that fix the trays.
- Extract the trays of the battery cabinet.
- Place eight battery blocks on the trays of the first, second, third and fourth level.
- Interconnect the blocks in series (block 1 / negative pole ==> block 2 / positive pole, according to the diagram on next page).

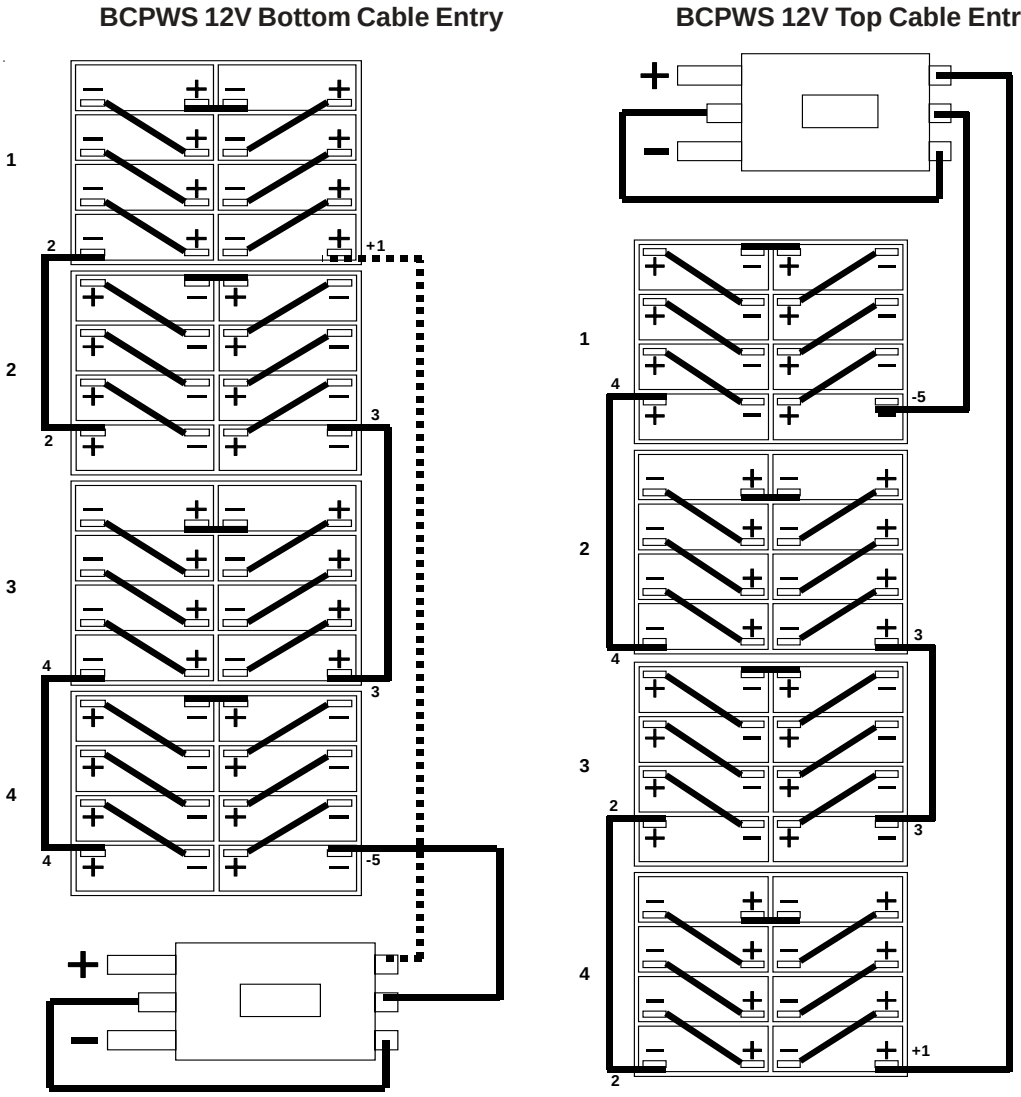


Figure 24. BCPWS 1x32/400 12V Battery layout - bottom & top cable entry

WARNING: after assembly there is a voltage of 96V on each level.

- Insert the trays and fix them with the screws.
- Connect the battery blocks of the various levels to IB, and connect IB to the relevant UPS terminals, as shown in figure 25.

Ensure appropriate ventilation of the battery room according to the standard 62040-1-1, to prevent the risk of an explosion.

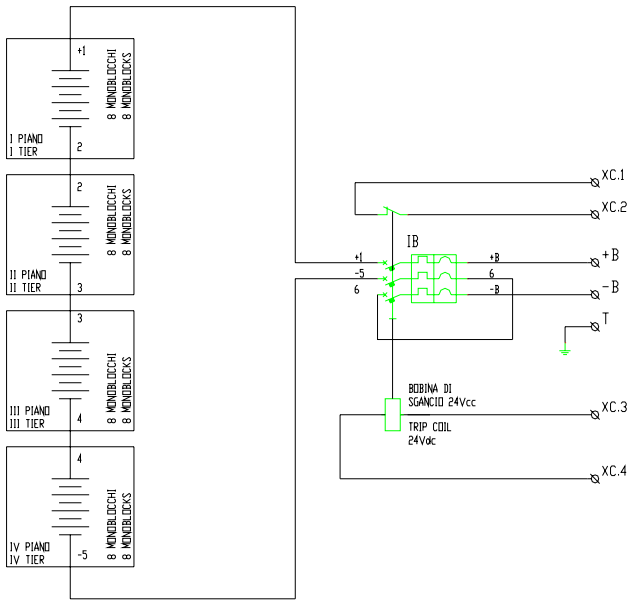


Figure 25. BCPWS 1x32/400 12V bottom cable entry electrical connections

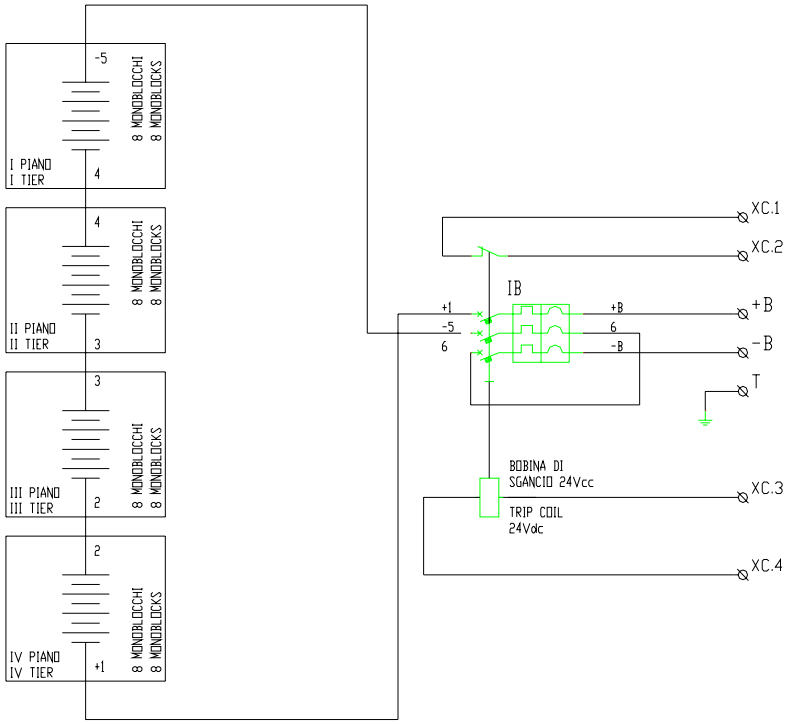


Figure 26. BCPWS 1x32/400 12V top cable entry electrical connections

BCPWD/400 & BCPWD/630 Battery Cabinet (64 Monoblocks 6V)

Dimensions:

Height 1900 mm

Width 1596 mm

Depth 860 mm

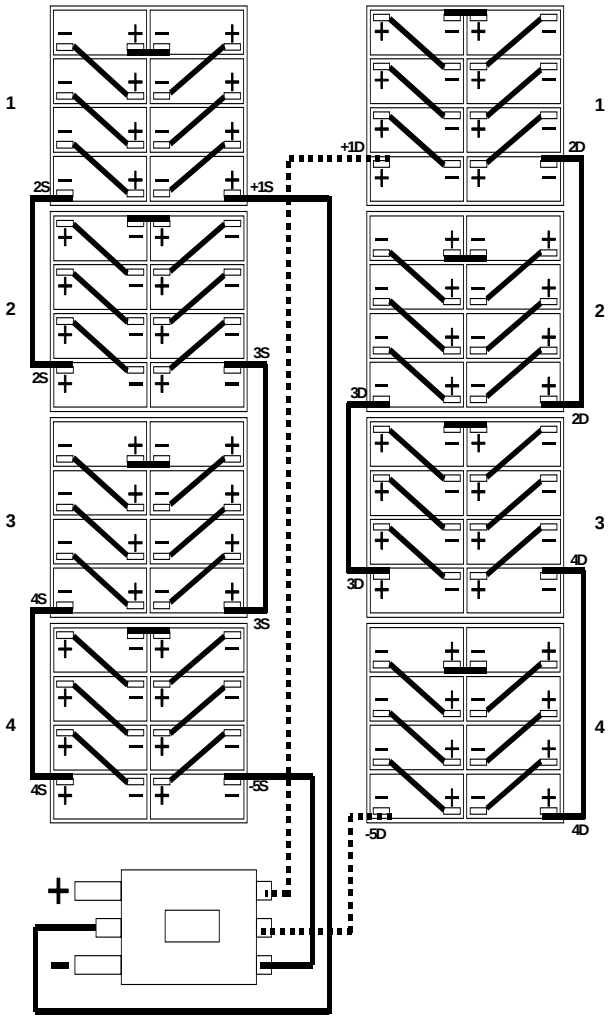
To assemble the battery cabinet:

IMPORTANT: Open the IB battery switch before connecting the cables.

- Remove the screws that fix the trays.
- Extract the trays of the battery cabinet.
- Place eight battery blocks on the left and right trays of the first, second, third and fourth level.
- Interconnect the blocks in series (block 1 / negative pole ==> block 2 / positive pole, according to the diagram on next page).

WARNING: The nominal voltage of the monoblocks must be 6V (in fact 64x6=384V (nominal voltage)

BCPWD 6V Bottom Cable Entry



BCPWD 6V Top Cable Entry

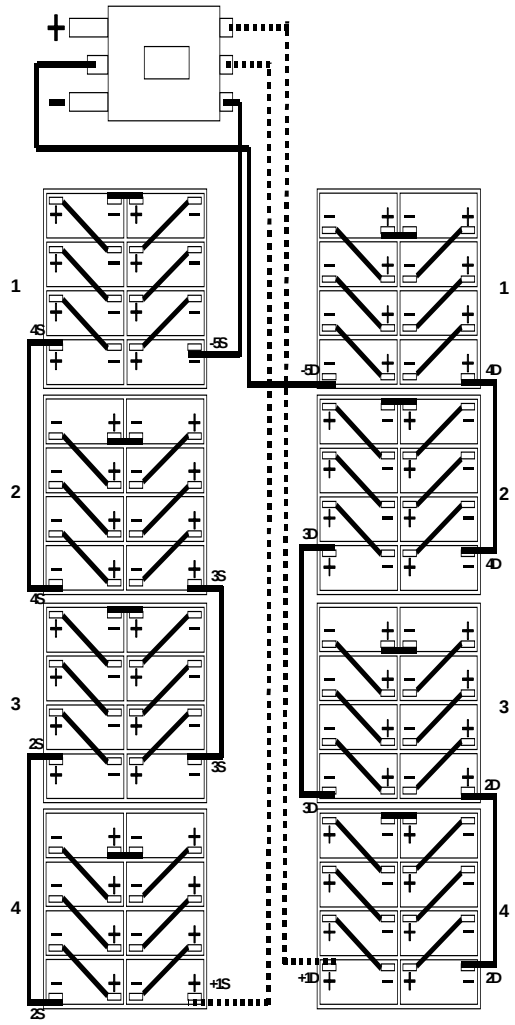


Figure 27. BCPWD/400 & BCPWD/630 6V bottom & top cable entry - battery layout

WARNING: after assembly there is a voltage of 48V on each level of left and right tiers.

- Insert the trays into the battery cabinet and fix them with the screws.
- Connect the battery blocks of the various levels to IB, and connect IB to the relevant UPS terminals, as shown in fig. 28.

Ensure appropriate ventilation of the battery room according to the standard 62040-1-1, to prevent the risk of an explosion.

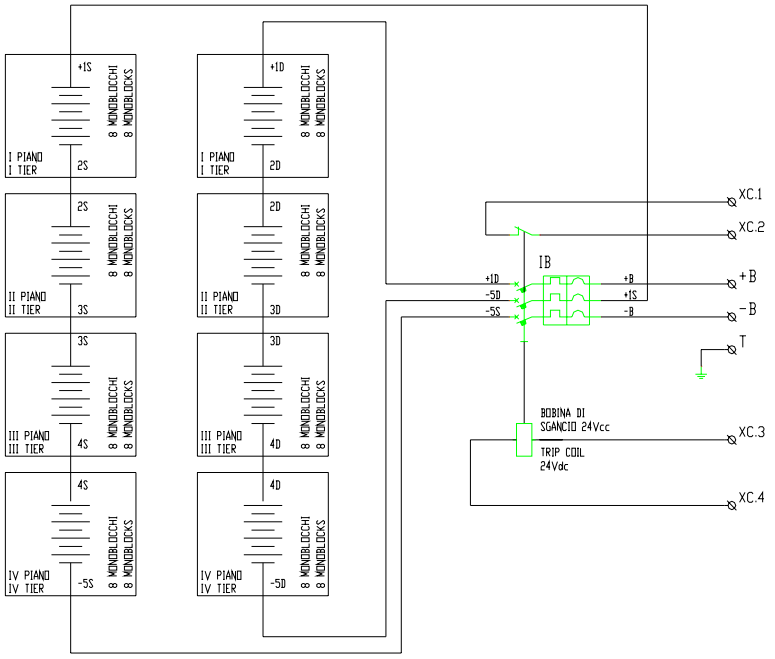


Figure 28. BCPWD/400 & BCPWD/630 6V bottom cable entry elect. connections

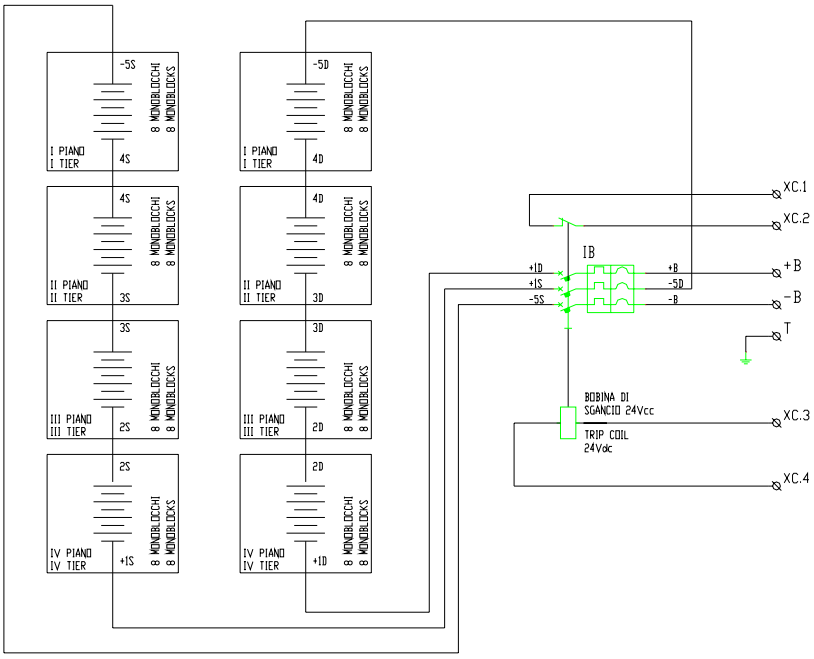


Figure 29. BCPWD/400 & BCPWD/630 6V bottom cable entry elect. connections

BCPWD-2x32/400 & BCPWD-2x32/630
Battery Cabinet (64 Monobloks 2x32 12V)

Dimensions:

Height 1900 mm

Width 1596 mm

Depth 860 mm

To assemble the battery cabinet:

⚠ **IMPORTANT:** Open the IB battery switch before connecting the cables.

- Remove the screws that fix the trays.
- Extract the trays of the battery cabinet.
- Place eight battery blocks on the left and right trays of the first, second, third and fourth level.
- Interconnect the blocks in series (block 1 / negative pole ==> block 2 / positive pole, according to the diagram on next page).

⚠ **WARNING:** The nominal voltage of the monoblocks must be 12V (in fact 32x12=384V (nominal voltage)

BCPWD 12V Bottom Cable Entry **BCPWD 2V Top Cable Entry**

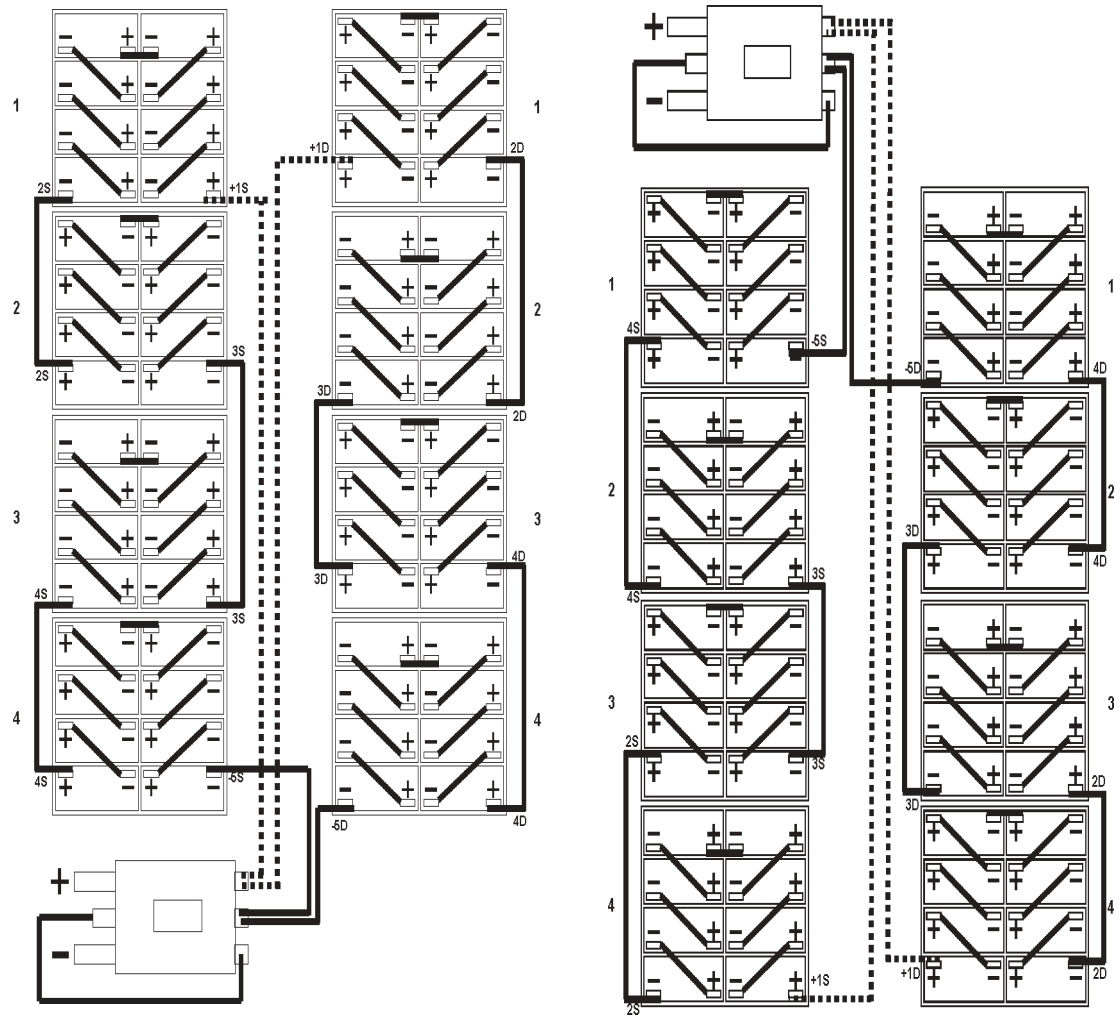


Figure 30. BCPWD/400 & BCPWD/630 2X32 12V bottom & top cable entry - battery layout

Warning: after assembly there is a voltage of 96V on each level of the left and right tiers.

- Insert the trays into the battery cabinet and fix them with the screws.
- Connect the battery blocks of the various levels to the IB battery switch, and the IB to the terminals, as shown in fig. 31.

Ensure appropriate ventilation of the battery room according to the standard 62040-1-1, to prevent the risk of an explosion.

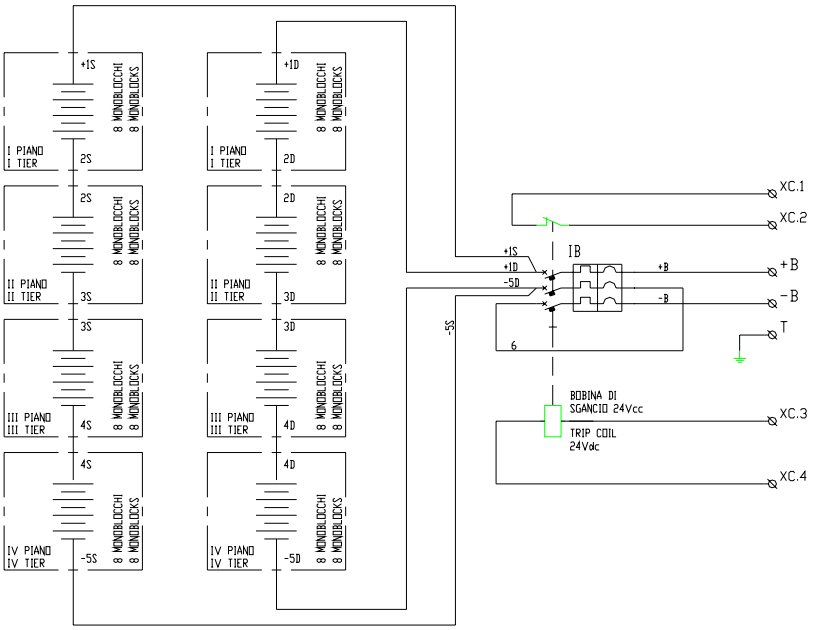


FIG. 31 BCPWD/400 & BCPWD/630 2X32 12V bottom cable entry electrical connections

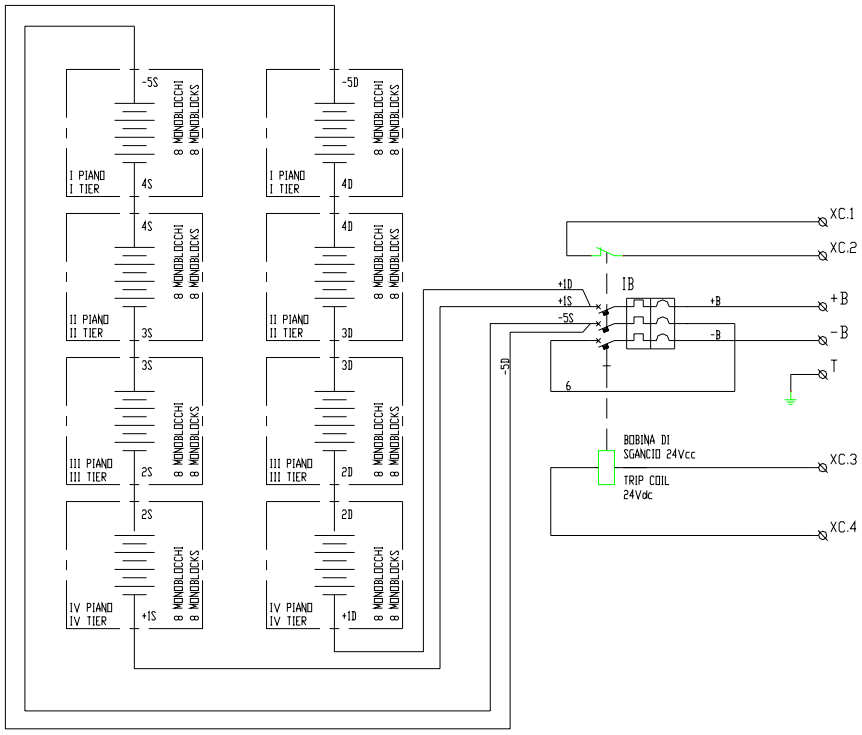


FIG. 32 BCPWD/400 & BCPWD/630 2X32 12V top cable entry electrical connections

6. Computer and alarm connections

An interface for direct communication with your computer system is supplied in the UPS unit. The interface consists of RS232 serial data interface, four optional X-slots, four potential free relays and four programmable inputs for building alarms. These interfaces are located behind the right-hand door.

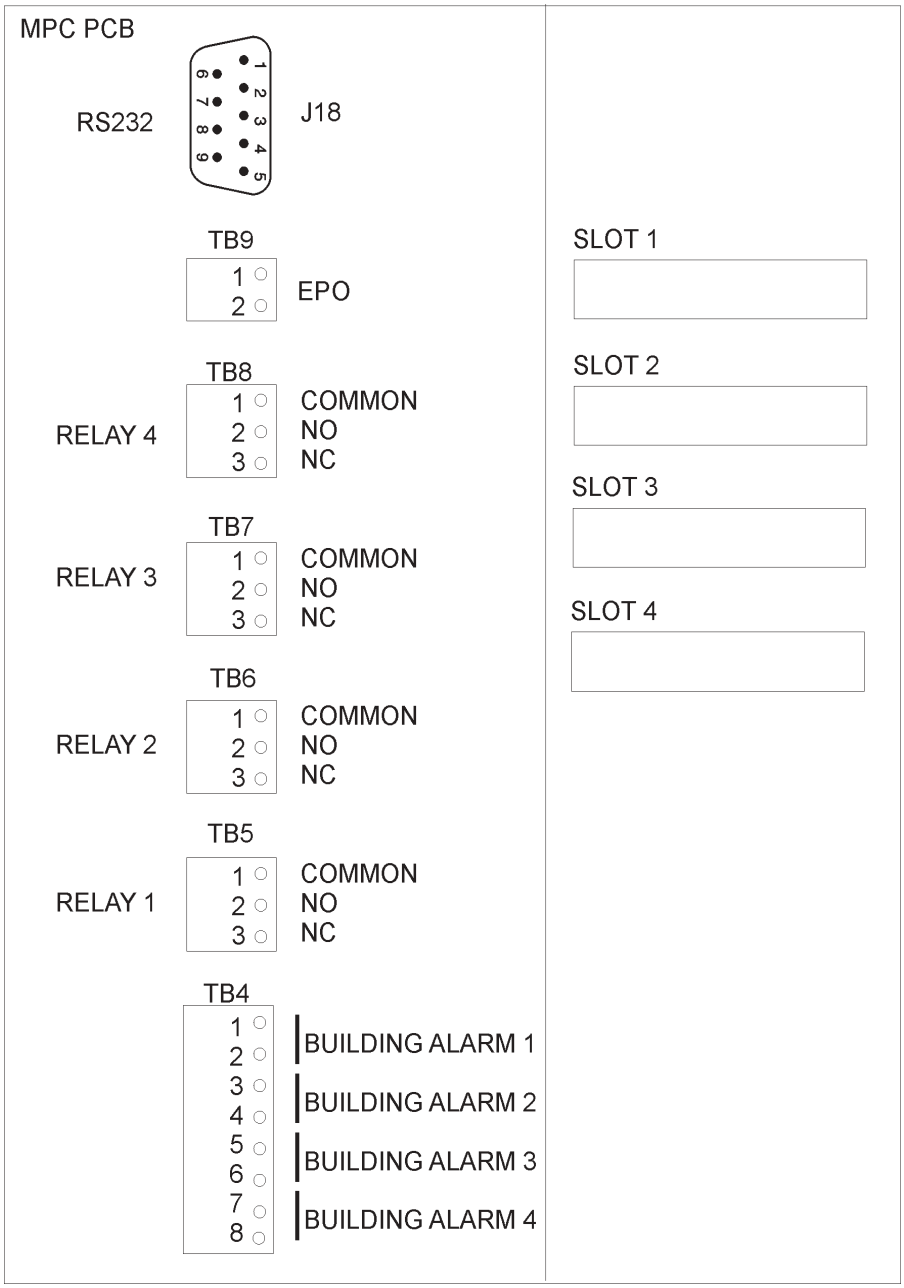


Figure 33. The user interface area

Note!

All connections mentioned in chapter 6 must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required.

The routing of the cables shall be done separate from any power cables

6.1 Connecting the UPS to a computer

The UPS is delivered as a complete solution package with accompanying Software Suite. To connect the UPS to the computer, use the communication cable provided with the package. (Note: If using other cable, verify the pin configuration from Table 5.) Check from the software documentation that the platform running on your computer is supported. Follow the instructions of the Software Suite to choose and complete the required software installation. For other operating systems, SNMP and more advanced power protection solution combinations, please contact your local dealer.

RS232 serial data interfaces

The RS232 interface J18 uses 9-pin female D-sub connector. The information includes data about the utility, load and the UPS itself. The connector J18 is to be used with a computer connection or a modem connection. See below the meaning of the pins. The RS232 must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required.

The baud rate can be configured for 1200/2400/9600/19200 bps from the LCD display. For appropriate baud setting refer to software manuals. The serial port has the following format:

- Data bits 8
- Parity None
- Stop bits 1
- Handshake None

Pin #	Signal name	Direction from the UPS	Description
2	RxD	Out	Received data
3	TxD	In	Transmitted data
5	GND	–	Signal ground
9	+V	Out	Power source 8 to 12 volts DC

Table 5. RS232 connection (J18) for the computer, 9-pin female D-sub.

6.2 Potential free relay outputs (TB5-TB8)

This relay interface consists of four potential free relays providing complete isolation between the UPS and the computer. The Relay 1 and Relay 2 are not used at the moment. The function for Relay 3 is “System on battery”. The function for Relay 4 is “UPS on/ok”. In figure 34 the relay is shown as de-energized.

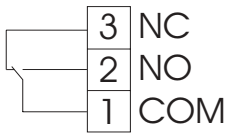


Figure 34. Programable output relay configuration. All potential free contacts.

Note! The relay contacts are rated for maximum 8 A/240 Vac or 5A/30 Vdc resistive load. All relay outputs are galvanically isolated from the other circuits of the UPS (IEC 60950, EN 620401-1). The relay contacts must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required.

6.3 Emergency Power Off Input (EPO) (TB9)

This input is used to shut down the UPS from a distance. This feature can be used for emergency power down, or for shutting down the load and the UPS by thermal relay, for instance in the event of room overtemperature. Remote shut down wires are connected to terminal block TB9 pins 1 and 2, (see figure 33).

The EPO terminals have been connected together at the factory. When this connection is open, the logic hard wire circuitry will immediately shut down the UPS, thus preventing the UPS from supplying the load. In order to have the UPS running again the EPO pins have to be connected and the UPS restarts. The pins must be shorted in order to keep the UPS running. Maximum resistance is 10 ohm. The EPO must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required.

⚠ The EPO condition is reset if the contact is closed after having opened, for this reason use a contact that latches in the open position and that can be reset only intentionally.

6.4 Inputs (TB4)

The UPS communication device includes four inputs (terminal block 4: 1-2, 3-4, 5-6, 7-8) for building alarms. These inputs can be used for example on Generator signal, shutting down and starting up inverter remotely or switching to bypass mode remotely. These inputs can be activated by connecting the two pins together of the particular terminal.
These inputs have the following values:

Generator On Input TB4:1,2

The Generator On input is used for inhibiting the transfer to static bypass line when the UPS is supplied by an unstable ac source.

The generator auxiliary contact wires are connected on terminal block 4: 1,2 (see figure 33). In normal operations the terminals 1 and 2 are not connected together. When these pins are connected together by floating contacts of the generator control device, the logic circuitry in the UPS will prevent the transfer to an unstable power source. When the unit is delivered the connection on terminals 1 and 2 will be open.

Remote Output On/Off Input TB4: 3, 4

The Remote Output On/Off input is used to turn off the output of the UPS from a distance. Remote Output On/Off wires are connected on terminals 3 and 4 (see figure 33).

The terminals 3 and 4 are not connected together in normal operation. When the pins are connected together by floating contact the inverter will be turned off and also the static bypass line will be turned off. In order to turn on the inverter and the static bypass line the connection between these pins has to be opened.

External Bypass Switch Input TB4: 5, 6

If the UPS system is equipped with an external bypass switch, its status can be monitored by the UPS via terminals 5 and 6. The external bypass switch auxiliary contact wires are connected on terminals 5 and 6 (see figure 33). For normal UPS operation the connection shall be open as default. If an external bypass switch will be used, contact your dealer first.

Environment Alarm Input TB4: 7, 8

The environment alarm input is used for connecting the UPS to your building alarms, such as overtemperature or smoke detector alarms.

The environment alarm input contact wires are connected on terminals 7 and 8 (see figure 33). When this alarm is activated it will be indicated to the user through RS232 ports. When connection on terminals 7,8 is open, the alarm is inactive as default.

Note!

The programmable auxiliary inputs (Generator ON, External Bypass Switch, Remote Output On/Off, Environment Alarm) must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required for equipments and cables connected to these connections.

Note!

The programmable auxiliary inputs are NOT galvanically isolated from each other. Use dry contacts.

WARNING: If the contacts must be connected to more than one input of the same board or to input of more than one unit, it's mandatory to respect the polarity.

6.5 X-Slot Modules

Optional X-Slot modules allow the UPS to communicate in a variety of networking environments and with different types of devices. The UPS is compatible with any X-slot module, including:

- RS232 Module - has one serial communication port.
- Modbus/Jbus Module - connects to an industrial automation system
- AS400 Relay Module - provides additional relay outputs
- SNMP/Web Module - has a flexible SNMP/Web communication port.
- Modem Module - provides modem functions for remote monitoring

7. User’s guide to operations

This chapter contains the necessary information on how to use the UPS.

The control panel provided to the user UPS status, measurements, alarms and history log. It is also used to control and configure the UPS with the function buttons underneath the display.

During commissioning the manufacturer representative will train the users to operate the UPS system.

7.1 Graphical Control panel

The monitor panel shows the status of UPS operation with five LED indicators and with a LCD screen. The display also generates audible alarm if the user should be alerted.

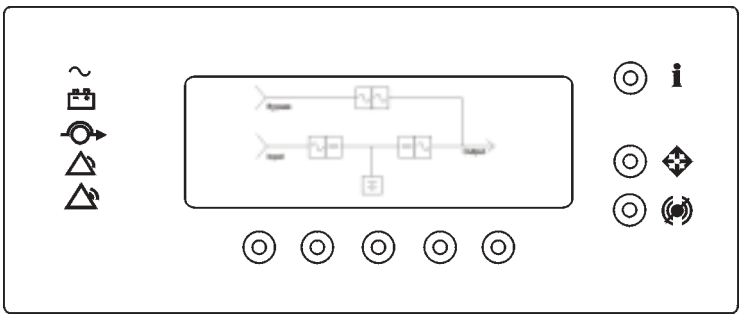


Figure 35. Control panel with the main screen

LED indicators

This green LED is lit when there is voltage at the output terminals and when the UPS is in normal or static bypass mode.

This yellow LED is lit when the UPS is operating in battery mode.

This yellow LED is lit when UPS is on and is operating in bypass mode.

This yellow LED is lit when there is an active notice that does not require immediate action.

This red LED is lit when there is an active alarm that requires immediate action.

There are five pushbuttons underneath the LCD display that are used to access the menu structure.

7.2 Menu structure

The UPS main menu allows you to display data in the information area to help you monitor and control UPS operation. The following menus and options are available:

Events Displays the list of Active Events and a historical log of system events.

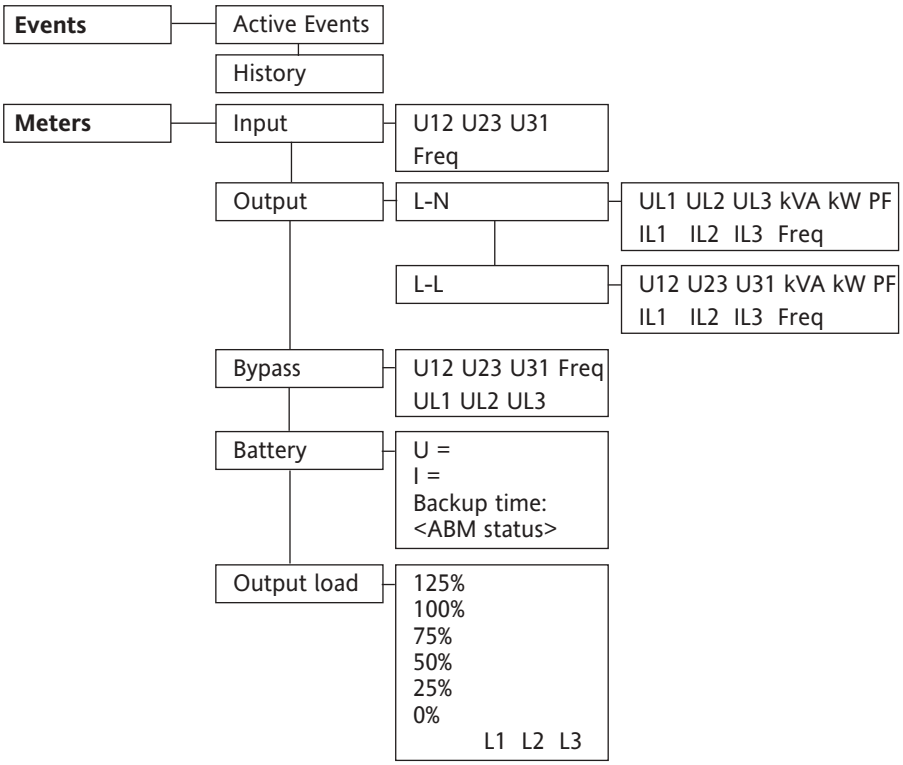
Meters Displays performance meters for the system or critical load.

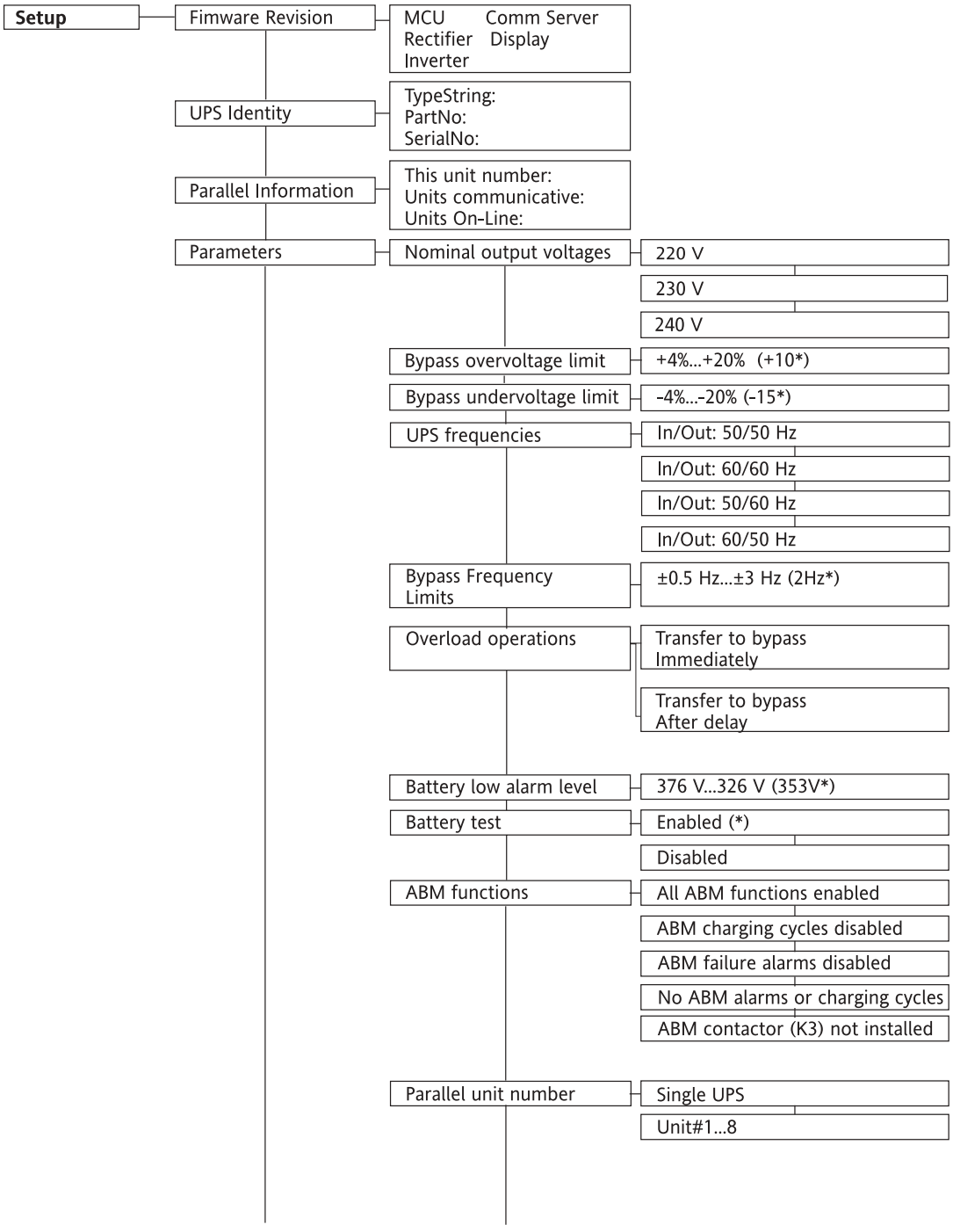
Setup Allows one to view contrast, date & time, firmware versions, system identity and parallel information. Configuration of the UPS requires a password. The password for changing defaults is **USER**.

↵ Returns to Main Menu and displays a real-time graphic representation of the power flow through the internal UPS components.

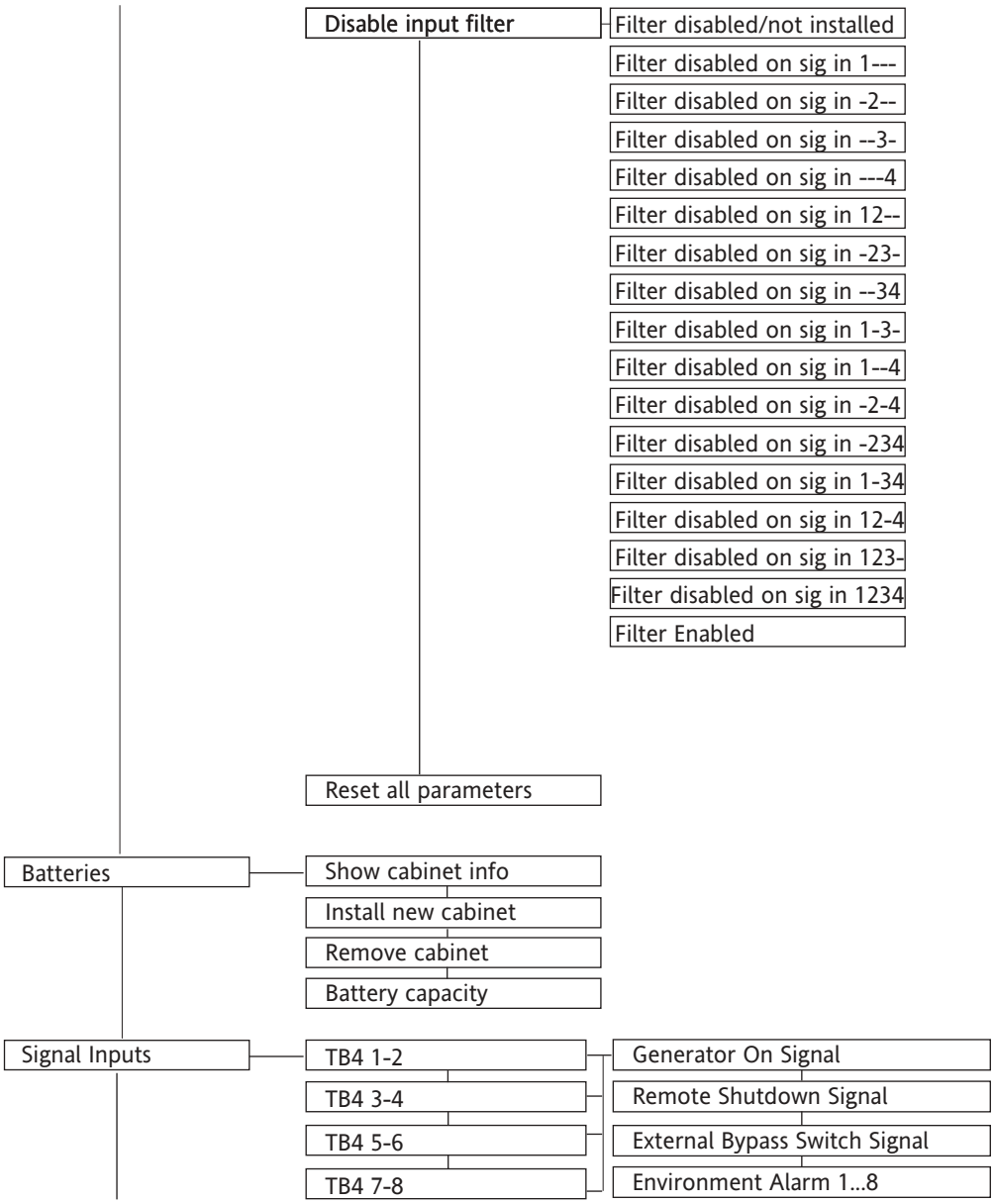
You can access the above mentioned menus by pressing the function button underneath the respective menu.

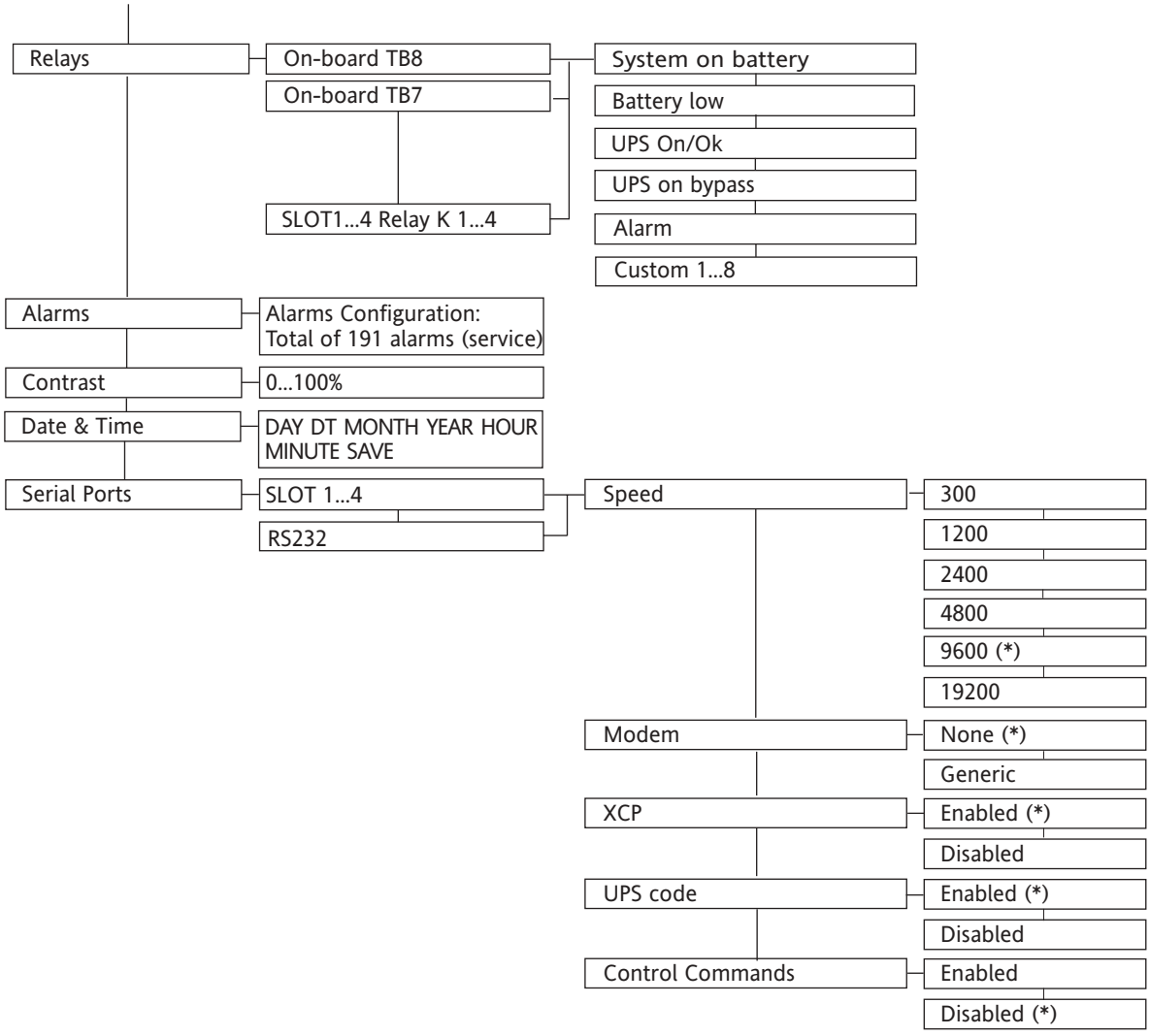
To scroll through the menu selections use ↑ or ↓ pushbuttons from the display menu.





*= default factory setting

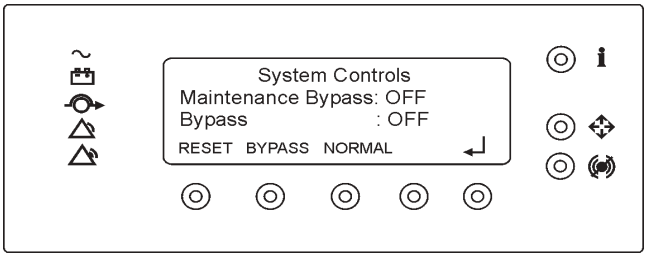

Disable input filter
Filter disabled/not installed
Filter disabled on sig in 1---
Filter disabled on sig in -2--
Filter disabled on sig in --3-
Filter disabled on sig in ---4
Filter disabled on sig in 12--
Filter disabled on sig in -23-
Filter disabled on sig in --34
Filter disabled on sig in 1-3-
Filter disabled on sig in 1--4
Filter disabled on sig in -2-4
Filter disabled on sig in -234
Filter disabled on sig in 1-34
Filter disabled on sig in 12-4
Filter disabled on sig in 123-
Filter disabled on sig in 1234
Filter Enabled
Reset all parameters
Batteries
Show cabinet info
Install new cabinet
Remove cabinet
Battery capacity
Signal Inputs
TB4 1-2
TB4 3-4
TB4 5-6
TB4 7-8
Generator On Signal
Remote Shutdown Signal
External Bypass Switch Signal
Environment Alarm 1...8


Relays
On-board TB8
On-board TB7
SLOT1...4 Relay K 1...4
System on battery
Battery low
UPS On/Ok
UPS on bypass
Alarm
Custom 1...8
Alarms
Alarms Configuration:
Total of 191 alarms (service)
Contrast
0...100%
Date & Time
DAY DT MONTH YEAR HOUR
MINUTE SAVE
Serial Ports
SLOT 1...4
RS232
Speed
300
1200
2400
4800
9600 (*)
19200
Modem
None (*)
Generic
XCP
Enabled (*)
Disabled
UPS code
Enabled (*)
Disabled
Control Commands
Enabled
Disabled (*)

7.3 Manual System Control

The System Controls screen appears when the pushbutton is pressed.

The transfer to bypass and back to normal mode are controlled from this screen by pressing the Bypass and Normal pushbuttons. As a safety feature the UPS can be locked to bypass mode via software and an alarm will be given. To return to normal operation press Reset and UPS will transfer to normal operation. These operations are controlled by the UPS firmware and allowed if the conditions for transfer are acceptable.



Pushbuttons

i	This button is for accessing the language selection menu **(future)**
	This button is used to access the manual system control menu: RESET - BYPASS - NORMAL
	This button is used to acknowledge the alarms and silence the horn.

7.4 Using the maintenance bypass switch

The UPS unit is provided with an internal maintenance bypass switch. This switch is used to bypass the UPS during maintenance or servicing.
Maintenance bypass switch is located behind the left door.
The maintenance bypass switch has the following positions:

OPEN (UPS)- normal position, inverter/static switch is supplying power to the load.

CLOSED (BYPASS)- the UPS is mechanically bypassed and the load is supplied from the bypass input power line. This position allows testing of the UPS without disturbing the load. When the UPS is turned off and the maintenance bypass switch is closed and IRP, IRE, IUG are opened, the UPS is isolated from the input and output power lines. Open the switch in the battery cabinets to isolate the UPS from the battery.

WARNING!

Dangerous voltages are still present on the switch terminals during the bypass operation.

Note!

Maintenance bypass switch is used only on rare occasions. If the bypass input frequency or voltage is not correct and the UPS is not synchronized to mains or static switch is not gated, turning the switch to bypass or UPS position may cause short break to output voltage. If the load is connected to maintenance bypass, the UPS is no longer protecting the critical load!

Going to the maintenance bypass mode

Before going to maintenance bypass, transfer the unit to static bypass mode by pressing the Bypass pushbutton in System Control menu on LCD screen. After this verify that UPS is in bypass mode (Bypass LED lit) .

Close the maintenance bypass switch IBY, (see “Shutting Down” procedure for more information).

Note!

When the UPS is a module of parallel system the internal maintenance bypass must not be used. If it is necessary to bypass the system, an external maintenance system bypass must be used (see “Installation of an External Maintenance Bypass” chapter)

Going to the UPS mode

Before opening the Maintenance Bypass Switch (IBY), verify that the bypass LED is lit . Verify that the UPS returns to Normal mode. It may be necessary to transfer the UPS to normal mode by pressing the Normal pushbutton in System Control menu.

If the rectifier input voltage is not present out of limits, the UPS will stay on bypass mode as long as the bypass input voltage is within limits. If the bypass goes out of limits or the rectifier input voltage returns within limits, the unit will transfer to normal mode (see “Starting up the UPS” procedure for more information).

7.5 Starting up the UPS

Make sure that UPS installation has been carried out correctly and battery line, neutral and protective earth inputs have been connected. Figure 11 shows the location of the switches.

The UPS is also provided with a battery start up feature when the ABM option is provided. In this case the UPS can be started if the input power line is not available or acceptable. In this case the UPS will be in battery mode supplying power from the batteries, or in the static bypass mode if the bypass line voltage and frequency are acceptable. During battery start-up the UPS will not transfer to normal mode if the bypass is within limits. The UPS will transfer to normal mode when the rectifier input voltage returns within limits or bypass voltage is no longer acceptable.

During battery start up UPS will charge the DC link capacitors from batteries and this causes longer start-up time.

Starting up the UPS, load energized
(bypass switch IBY is closed and voltage is present in the output terminals, see figure 8a)

- Open the left door of the UPS
- Check that On/Off switch S1 is in OFF position
- Check that the Maintenance Bypass Switch IBY is closed
- Turn the switches IRP and IRE to ON position
- Start the UPS by turning the switch S1 to ON position

The UPS will now check its internal functions. The UPS starts after 10 – 15 s.

- Check that the yellow bypass LED is lit .
- Close IUG switch.
- Check that there are no active alarms that require immediate action.
- Open Maintenance Bypass Switch IBY.
- Check that inverter is running and close the external battery circuit breaker
- Close the left door of UPS.

Note! Do not close the Battery Circut Breaker until the inverter is running.

Starting up the UPS, load de-energized
(Bypass Switch IBY is open and voltage is not present in the output terminals, see figure 11)

- Open the left door of the UPS section
- Check that On/Off switch S1 is in OFF position
- Check that the Maintenance Bypass Switch IBY is open.
- Turn the switches IRP and IRE to ON position
- Start the UPS by turning the switch S1 to ON position

The UPS will now check it's internal functions. The UPS starts after 10 – 15 s.

- Check that inverter is running and then close the external battery circuit breaker
- Close IUG switch
- Close the left door of UPS

Note! Do not close the Battery Circut Breaker until the inverter is running.

Note! The UPS start up without mains is possible only if ABM option is installed according to the following procedure:

- Open the left door of the UPS section
- Check that On/Off switch S1 is in OFF position
- Check that IRP is open
- Check that the maintenance bypass switch IBY is open
- Close the battery circut breaker
- Start the UPS by turning ON the S1 switch

The UPS will precharge the inverter input capacitors and the inverter will start in 1-2 minutes

- Check that inverter is running
- Close IRP and IRE if present
- Close IUG switch
- Close the UPS door

7.6 Shutting down the UPS

The UPS unit does not have to be shut down at the end of each day. The unit is designed to cope with a continuous load from the day it is installed until a change is needed in the backup battery bank.

Shutting down to Maintenance Bypass:

- Go to System Control menu in LCD display and press Bypass pushbutton to transfer to static bypass mode.
- Verify that the Bypass LED is lit.
- If the Bypass LED is not lit, check the active events to verify the reason and correct the anomalous condition.
- Open the left door of the UPS.
- Close the Maintenance Bypass switch IBY.
- Turn the on/off switch S1 to OFF position.
- Turn the switch IUG to OFF position.
- Turn the switches IRP and IRE to OFF position
- Open the Battery Circuit Breaker in the battery cabinets
- The UPS stops supplying power. The load is supplied through mechanical bypass.

Shutting down and disconnecting load:

- Open the left door of the UPS.
- Turn the on/off switch S1 to OFF position.
- Turn the switch IUG to OFF position.
- Turn the switches IRP and IRE to OFF position
- Open the Battery Circuit Breaker in the battery cabinets
- The UPS stops supplying power.

Note! Units equipped with ABM automatically open the ABM contactor to isolate the battery.

Battery Circuit Breaker must be disconnected to ensure safe operation of the UPS battery terminals.

8 Installation of an External Maintenance Bypass

An External Maintenance Bypass is used to provide a separate bypass line external to the UPS cabinet to supply the load when servicing the UPS. To allow transfer of the load to the bypass line without interruption a single Make-Before-Break (MBB) switch is used.

When the external maintenance bypass is installed, a normally open, voltage free contact is available. This contact must be connected to the connector TB4 of MPC board, Pin5 and Pin 6

There are 6 types of Maintenance Bypass Cabinet:

MB3 2 switches: 250kVA, 500kVA, 800kVA

MB3 3 switches: 250kVA, 500kVA, 800kVA

2 Switch Maintenance Bypass

The two switch Maintenance Bypass consists of two internally interconnected 4 pole switches which provide a make-before-break changeover from/to the UPS output and the external bypass supply by manually switching a single key-interlocked switch. An interlock is provided to prevent erroneous switching of the maintenance bypass if the inverter supply is still connected to the UPS system output. The three positions are labelled "I" for normal, "II" for bypassed and "I + II" when both switches are closed. When switching to the maintenance bypass, the switch must be switched all the way to position "II".

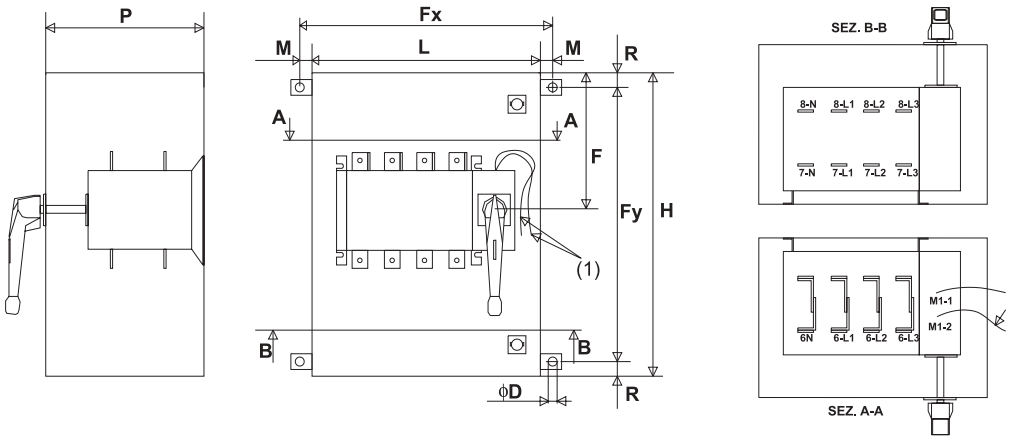


Figure 36. MB3 2 switches

Bypass 2 interruttori (*)		L	H	P	F	D	Fx	M	Fy	R	Peso (Kg)
400A	250kVA	600	700	300	350	9	648	24	652	24	30,5
630 A	400 kVA	700	600	400	300	9	448	24	552	24	37,7
800A	500kVA	700	1200	500	600	9	748	24	1152	24	73,5
1250A	800kVA	700	1200	500	600	9	748	24	1152	24	80,6

(*) The power rating is referred to 400Vac

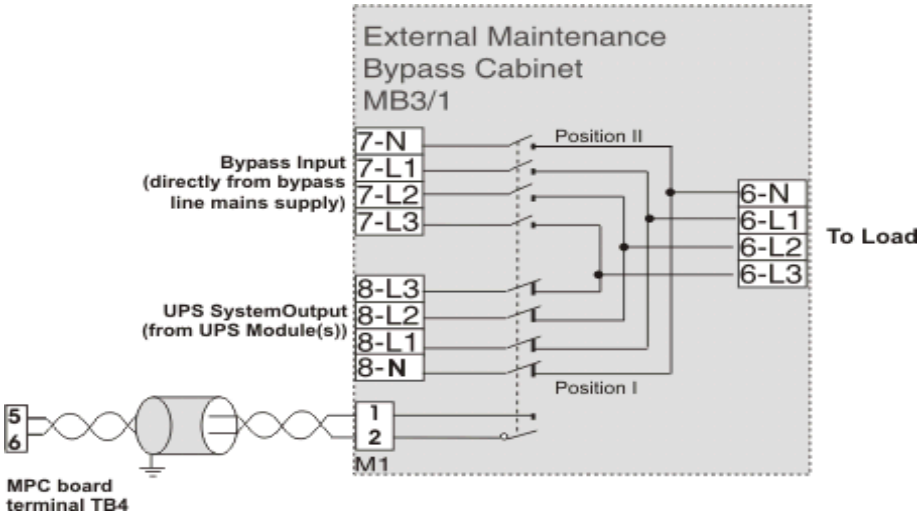


Figure 37. External Maintenance Bypass Switch (2 position)

3 Switches Maintenance Bypass

The three switches of the Maintenance Bypass consist of three internally interconnected 4 pole switches which provide a make-before-break changeover from / to the UPS output and the external bypass supply with a single manual operation of the key-interlocked switch. In the third position (II) the UPS is isolated from the mains supply. An interlock is provided to prevent erroneous switching of the maintenance bypass if the inverter supply is still connected to the UPS system output. The three positions are labelled "I" for normal, "II" for isolated and "I + II" when both switched are closed. To isolate the UPS system, the switch must be switched all the way to position "II".

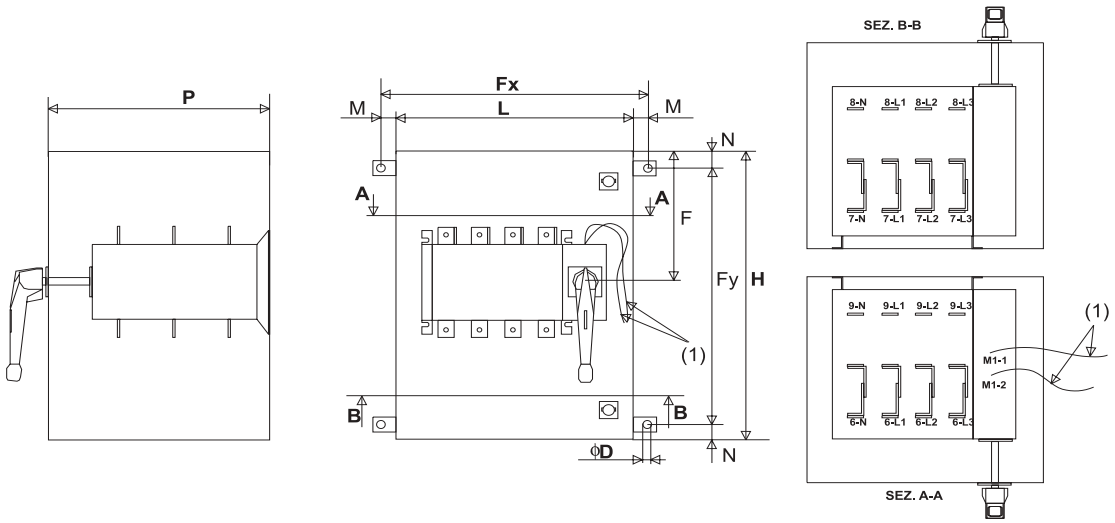


Figure 38. MB3 3 switches

Bypass 3 Switches (*)		L	H	P	F	D	Fx	M	Fy	R	Weight (Kg)
400A	250kVA	600	800	500	400	9	648	24	752	24	42,4
630A	400 kVA	600	600	500	400	9	648	24	752	24	39,6
800A	500kVA	700	1200	550	600	9	748	24	1152	24	87,0
1250A	800kVA	700	1200	550	600	9	748	24	1152	24	98,1

(*) The power rating is referred to 400Vac

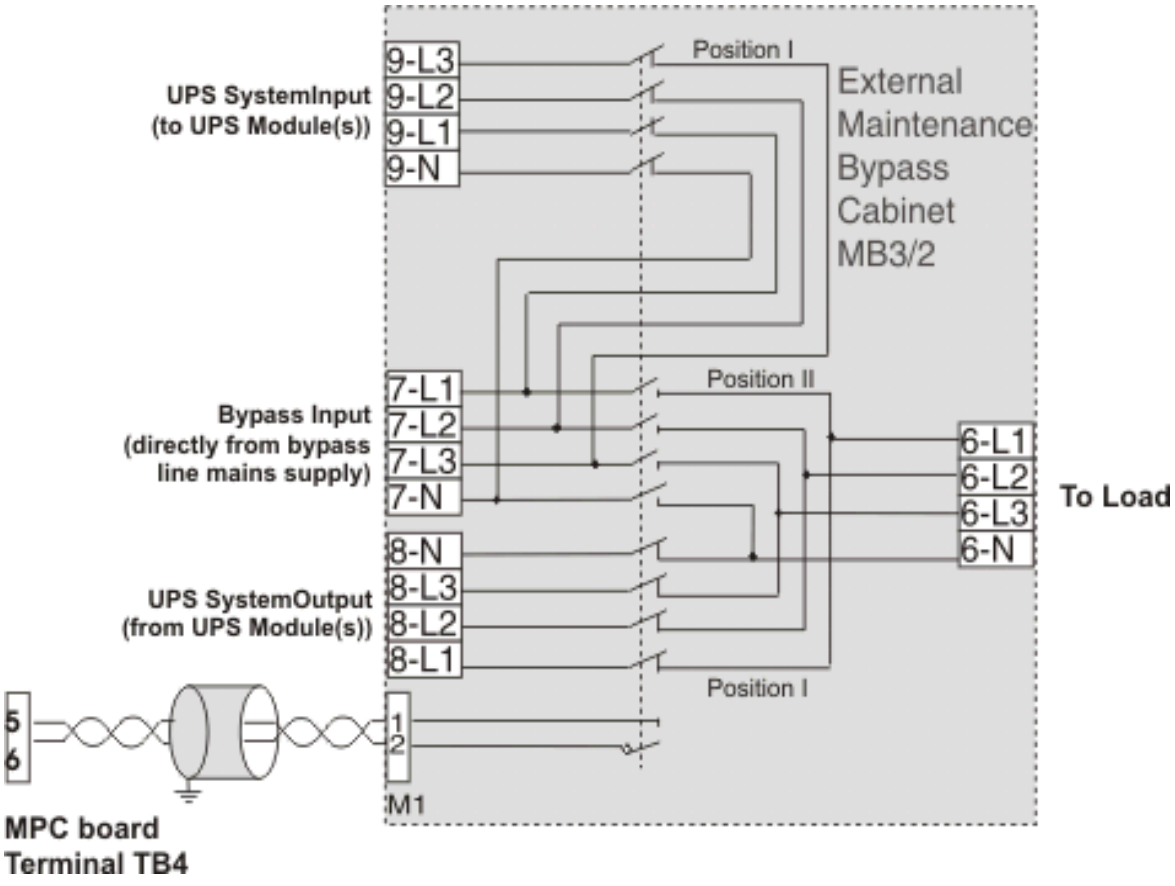


Figure 39. External Maintenance Bypass Switch 3 position

9. Parallel UPS System

9.1 Introduction

Up to 8 UPS modules (Hot Sync™) may be installed together in the parallel for Redundancy or Capacity system.

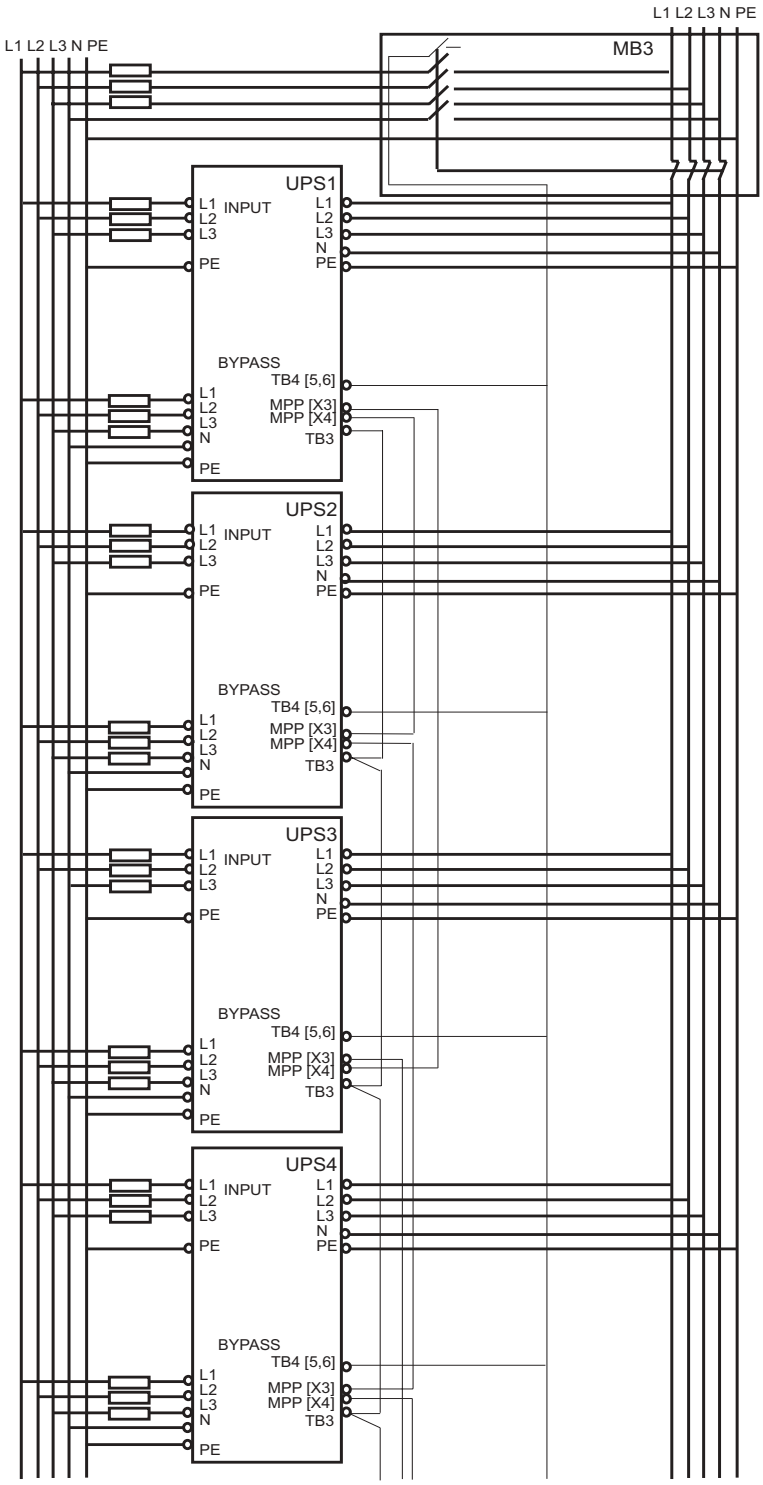


Figure 40. System wiring diagram of 1-8 parallel UPS modules.

9.2 Selecting redundancy or capacity mode

A parallel system is parameter selectable between N+1 redundancy and capacity modes. The parameters are displayed in the LCD control panel. Factory default is the parallel system for N+1 redundancy where user gets an alarm if the +1 redundancy level is exceeded in the load.

9.3 Installation requirements

The system is designed with all vital parts accessible from front. Power cable entries are from bottom or top (optional). Separately from the power cabling, signal cable routing can be done from the top or bottom, depending on installation.

Power cables

All input cables, bypass cables, output cables and system bypass cables of the parallel UPS system must be dimensioned according to local regulations.

1. The cable must be able to carry the nominal current. Pay attention to proper dimensioning of neutral (N) according to the load type.

2. The cable must be rated for at least 70°C maximum operating temperature and copper cables should be used to fit terminals.

3. The cable must fulfil the requirements of the short circuit and overcurrent protection level with the correct fuse size.

Note!
The total length of UPS bypass and output cables must be inside ±10% tolerances and the same type. Due to the same cabling impedance, the equal cables mean equal load sharing for the static bypass mode. Negligence of the instructions may cause the parallel UPS system to lock in the bypass mode after overload or load transient situation.

System communication with a CANBUS interface

A 10-meter CANBUS interconnection cable with termination resistors (2*120 ohm) are supplied for parallel UPS modules. The CANBUS cable must be connected between the TB3 terminals of two successive UPS modules as shown in the earlier wiring diagram of parallel UPS system. A shielded, twisted pair cable with maximum length of 40 meters must be used.

The CANBUS is a linear communication interface. It must not form a loop configuration. Intermediate termination resistors are removed in parallel systems of more than 2 UPS modules. Only the first and last UPS modules in the CANBUS chain must have a termination resistor fitted in cable end connected to TB3 terminals pin 1 ‘CANH’ and pin 2 ‘CANL’.

Refer to board assembly drawing for pin numbering.

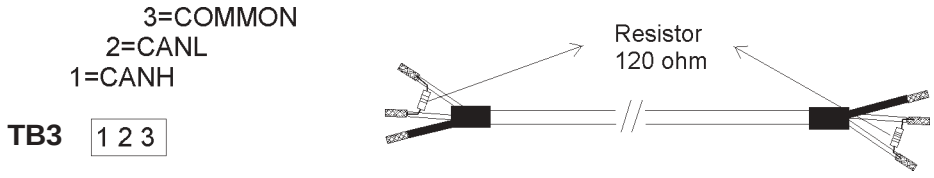


Figure 41. TB3 communication terminals of UPS modules and CAN cable with resistors.

Note!
Pay attention to the signal polarity because pins 1 ‘CANH’ and pin 2 ‘CANL’ must not be interchanged between UPS modules. The shield is connected to pin 3 ‘COMMON’ on the TB4 terminal from both ends.

Hot Sync™ communication with a 6-pin parallel interface

In addition to the CANBUS cable, a 6-pin parallel intercommunication cable (10-meters) is supplied with parallel UPS modules. The cable forms a redundant communication interface between successive ‘MPP’ communication boards of UPS modules.

The ‘MPP’ communication boards have parallel terminals X3 and X4. The 6-pin parallel cable must be connected between these two terminals of UPS modules. It’s recommended that the cabling form a loop configuration to increase redundancy level of pararallel communication. Shield connection to PE shall be performed on the X4 side of the connection. This way there should be only one shield connection in each unit.

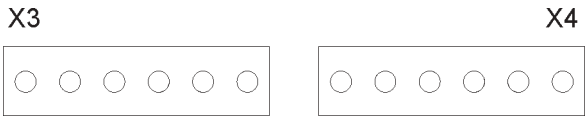
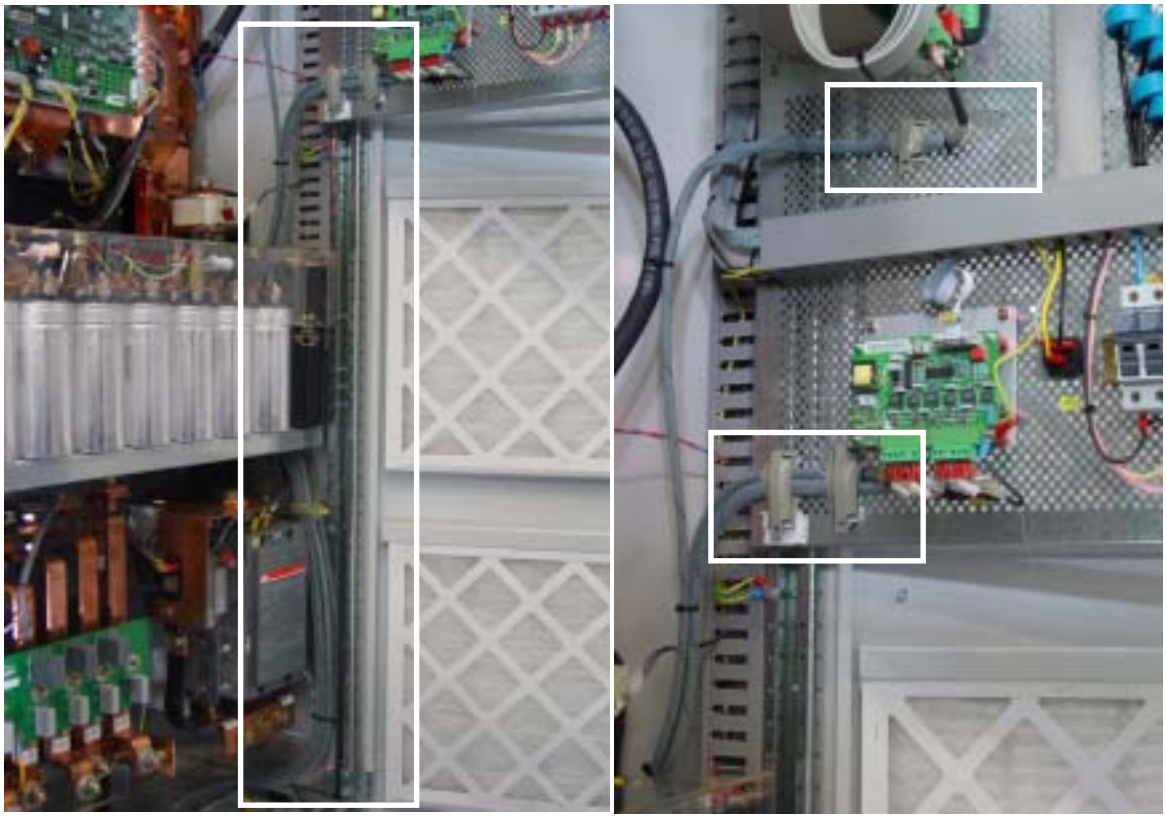


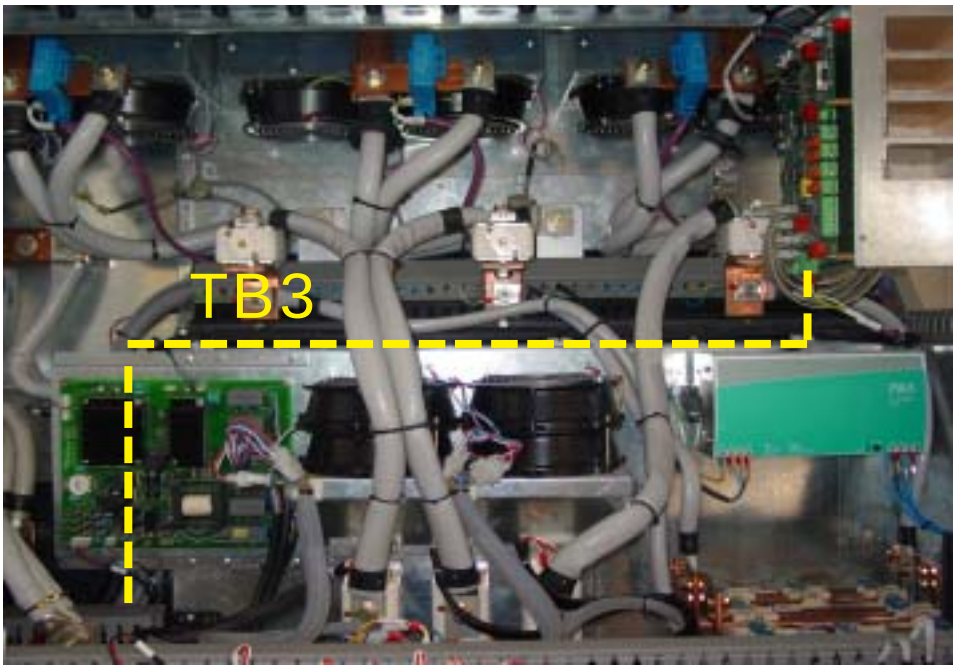
Figure 42. X3 and X4 communication terminals in the MPP communication board.

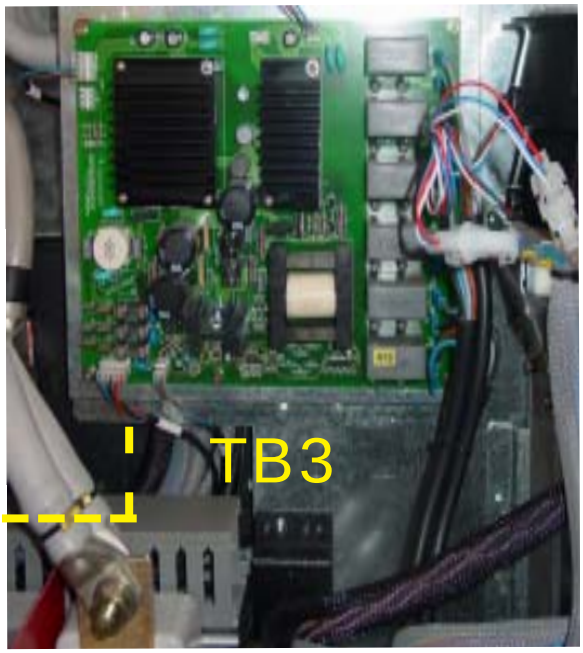
See picture 1 for UPS 160-250kVa signal cable fixing, see pictures 2,3,4 for UPS 400-500kVA signal cables fixing



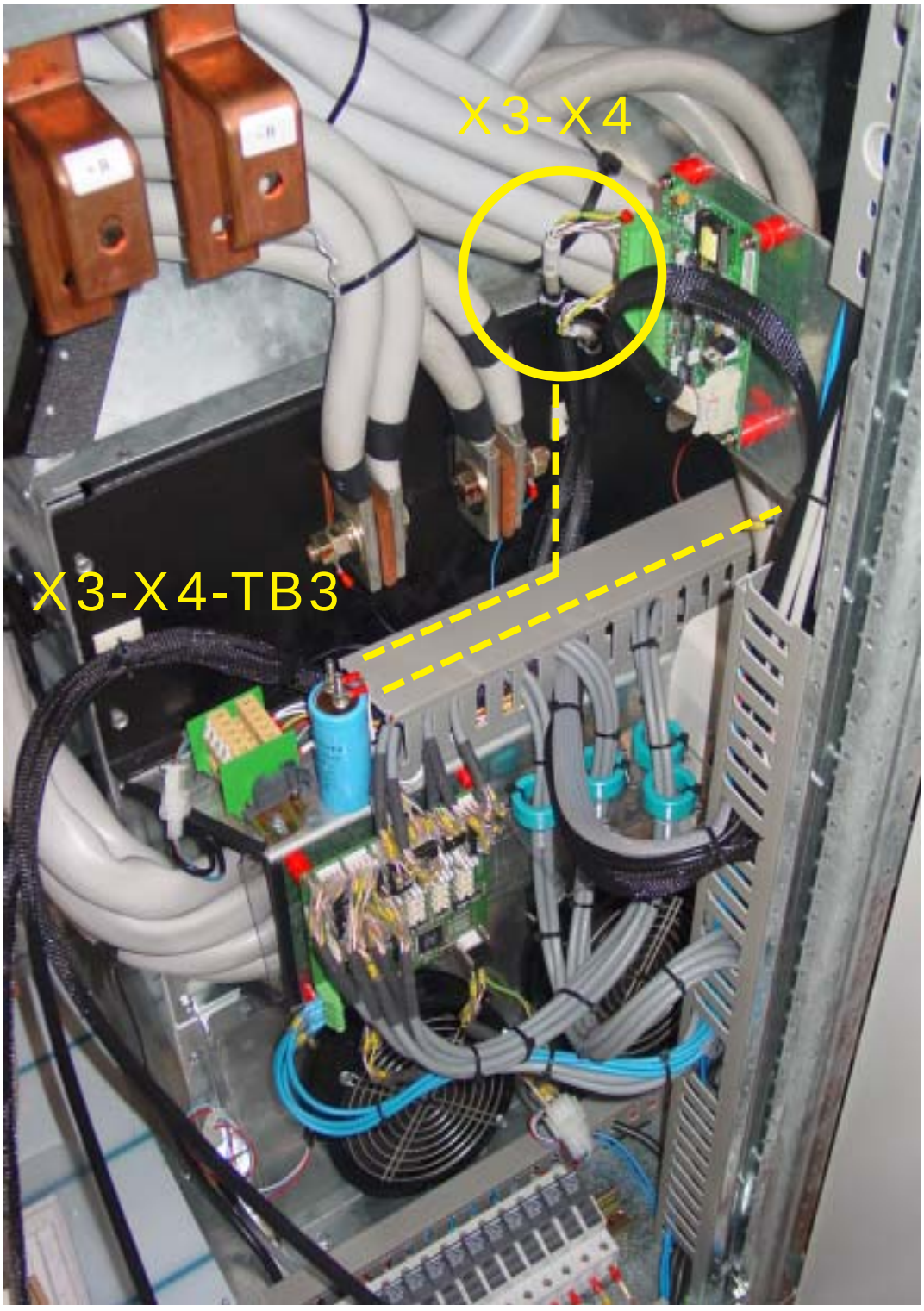
Picture 1. UPS 160-250kVA Signal cables fixing

Picture 2. UPS 400-500 kVA Signal cables fixing





Picture 3. UPS 400-500 kVA, TB3 Signal cable fixing



Picture 4. UPS 400-500 kVA, X3-X4 Signal cables fixing

If an external system bypass switch (MB3) is used, an auxiliary contact must be provided to each individual UPS module. It's connected to the TB4 'BUILDING ALARM 3' terminal and between pins 5 and 6.

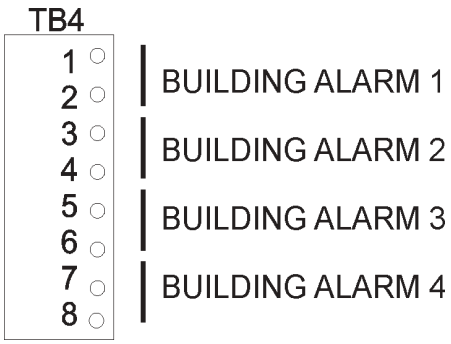


Figure 43. TB4 signal terminal of UPS modules.

Note!
Pay attention to the signal polarity because the signal must be the same for all UPS modules. Negligence of the instructions may cause a high inrush currents to bypass line/UPS output, and cause a load dump. Moreover, it in under no circumstances allowed to operate the UPS internal mechanical bypass switch. The handle must be removed if it is fitted to the UPS modules.

For proper transfer the auxiliary contact must close before the main power contacts when switching from UPS position to BYPASS position. The auxiliary contact from the bypass switch should be with minimum of 10 ms leading operation. The common system bypass signal initiates parallel UPS modules to gate static switch regardless of internal bypass condition or inverter synchronization.

9.4 System Startup

Check that the power and control wiring has been done correctly before starting up any UPS modules. There should be voltage in both rectifier and internal bypass input. Make sure that ground connections have been done.

The parallel UPS system 1 to N should be started in the orderly manner:

1. Check that the UPS modules are in the start-up condition and open front door:
   - Main switch S1, input switches IRP & IRE, and the battery breaker are in OFF position.
2. Check that the system bypass switch MB3 is in the 'BYPASS' position, and the IUG switches of all the systems are in the ON position.
   Note! Battery start of parallel UPS modules must be made in the 'UPS' position of system bypass switch MB3.
3. Start all UPS modules within 30 sec. to prevent start of a single module with overload:
   - Turn on the input switches IRP & IRE to 'ON' position.
   - Start the UPS modules by turning switch S1 to the 'ON' position.
   - Check that the yellow bypass LED is lit (this verifies that auxiliary contact signal from the external system bypass switch MB3 is OK)
   - Check that the inverter is running
   - Close the battery breaker in the battery cubicle
   - Repeat for all the units

4. Transfer the critical load to the parallel UPS system by turning the external system bypass switch MB3 to ‘UPS’ position.

5. Check from LCD display of UPS modules that the parallel system is running on inverter power instead of static bypass. Hence, the critical load should be now supplied by the parallel UPS system.

9.5 System Shutdown

The UPS system does not have to be shut down at the end of each day. The system is designed to cope with a continuous load from the day it is installed until a change is needed in the backup battery bank.

In the N+1 redundancy mode, it is possible to shut down a single UPS module for service. In the capacity mode, the external system bypass switch MB3 must be first used to transfer the system load to external bypass power.

The redundant UPS module of the parallel UPS system can be switched off in the following manner if no critical UPS alarms are present:

1. Check that all UPS modules are in the operational condition and open front door of the selected UPS module:
   – Main switch S1, switches IRP and IRE and the battery breaker in the battery cubicle are in ‘ON’ position

2. Check from control panel that the parallel UPS system is in the N+1 redundancy mode.
   Note! The external system bypass switch MB3 must be used for transfer operation if the system has capacity mode and load exceeds N+1 redundancy level. Hence, the load must be disconnected if the parallel UPS system does not contain the system bypass switch.

3. Turn the S1 switch to OFF position

4. Turn the main input switches IRP & IRE and the battery circuit breaker to ‘OFF’ position:
   - The selected UPS module has now stopped to supply output power.

5. Turn the appropriate output breaker IUG to ‘OFF’ position. This prevents high voltage to be present inside the disconnected UPS module.

WARNING!

Even though the input and output switches are open there is still a dangerous voltage inside the unit (on all the parts upstream the input switches and downstream the output switches).

Note!
UPS modules should be transferred to static bypass from the LCD control panel before operating the system bypass switch MB3. This procedure ensures UPS modules to check for the internal bypass condition and inverter synchronization. A safe transfer is not guaranteed if the system bypass switch MB3 is operated without first transferring UPS modules to static bypass mode. Remember to check from the LCD control panel that UPS modules return to online mode in the ‘UPS’ position of system bypass switch MB3.

10. Maintenance

All operations inside the unit must be carried out only by a service engineer from the manufacturer or from an agent, authorized by a manufacturer.

Battery maintenance

The condition of the batteries is crucial to correct operation of the UPS. The UPS units are provided with the automatic battery test, which continuously monitors the condition of the battery bank. When the capacity of the battery bank has decreased remarkably, the UPS will indicate this by audible and visual alarms.

In addition to the automatic battery test it is recommended that a battery discharge test is done once or twice per year. This test is recommended to be done together with the preventive maintenance by service engineer from the manufacturer of by an agent authorised by the manufacturer.

11. Recycling the used UPS or batteries

Before scrapping UPS or its battery cabinet the batteries must be removed. Due to high energy and high voltage, removal of batteries is allowed only for authorised service personnel.

Do not discard waste electrical or electronic equipment or batteries in the trash.

For proper disposal, contact your local collecting/recycling/reuse or hazardous waste center and follow the local legislation.

These symbols indicate on a product :

Use proper local collecting centers meeting local legislation when handling waste of electrical and electronic equipment.

WARNING!

HAZARDOUS MATERIALS. Batteries may contain HIGH VOLTAGES, and CAUSTIC, TOXIC and FLAMMABLE substances. Batteries can injure or kill people and damage equipment if used improperly. DO NOT DISCARD unwanted batteries or battery material in the public waste disposal system. Follow ALL applicable, local regulations for storage, handling and disposal of batteries and battery materials.

12. Warranty

The product is warranted against defects in material and workmanship for a period of 12 months from its original date of purchase.

13. Technical specifications

1. General charasteristics

1.1 UPS models	160 kVA: 9370-160
	200 kVA: 9370-200
	250 kVA: 9370-250
	400 kVA: 9370-400
	500 kVA: 9370-500
1.2 Technology	Double conversion online UPS topology with automatic bypass switch and maintenance bypass switch
1.3 Performance	Class VFI-SS-111 voltage and frequency independent operation
1.4 Efficiency	93% at nominal load
1.5 Standards	Performance: EN62040-3, IEC62040-3; Safety: IEC62040-1-1, IEC60950; EMC: EN50091-2, IEC62040-2
1.6 Conformity	CE, ISO 9001

2. Mechanical construction

2.1 Dimensions (WxDxH)	UPS 160-250 kVA 6P: 1220x860x1900 mm
	UPS 160-250 kVA 12P: 1620x860x1900 mm
	UPS 400-500 kVA: 2150x860x1900 mm
2.2 Weight	1130 kg (160-250 kVA 6P UPS model)
	1820 kg (160-250 kVA 12P UPS model)
	1910 kg (160-250 kVA 12P UPS with THD Filter)
	2880 kg (400-500 kVA UPS)
2.4 Enclosure	IP20
2.3 Color	RAL 7035
2.5 Cabling direction	Bottom (Top is optional for 160-250 kVA UPS); Bottom & Top for 400-500 kVA UPS

3. Eletrical Characteristics / Input

3.1 Nominal voltage	220/380, 230/400, 240/415 V; 50/60 Hz
3.2 Input voltage range	342 to 456 V; 45 to 65 Hz
3.3 Rated input Current	160 kVA: 3 x 265 A; 3 x 216 A with THD filter 200 kVA: 3 x 331 A; 3 x 280 A with THD filter 250 kVA: 3 x 413 A; 3 x 350 A with THD filter 400 kVA: 3 x 640 A; 3 x 565 A with THD filter 500 kVA: 3 x 790 A; 3 x 700 A with THD filter
3.4 Input Power factor	0,8 lagging: 0,95 at rated current with filter

4. Electrical Characteristics / Output

4.1 Nominal power at PF 0.8	160 kVA / 128 kW 200 kVA / 160 kW 250 kVA / 200 kW 400 kVA / 320 kW 500 kVA / 400 kW
4.2 Nominal voltage	220/380, 230/400, 240/415; 50/60 Hz
4.3 Crest factor	3:1 computer and server loads
4.4 Linear loads	0.6 to 0,95 lagging/leading
4.5 Voltage regulation	±1% static, ±5% dynamic;
4.6 Current	160 kVA: 3 x 231 A 200 kVA: 3 x 289 A 250 kVA: 3 x 361 A 400 kVA: 3 x 578 A 500 kVA: 3 x 722 A
4.7 Short circuit capability	
- max 300 ms duration	Amp phase to neutral (inverter) 160 kVA: 1083 A 200 kVA: 1083 A 250 kVA: 1083 A 400 kVA: 1734 A 500 kVA: 2166 A Amp phase to phase (inverter) or limited by the bypass line impedance and fusing. 160kVA: 626 A 200kVA: 626 A

	250kVA: 626 A
	400kVA: 1000A
	500kVA: 1250A
4.8 Voltage distortion (VHD)	1% with linear loads; 5% with non linear loads
4.9 Syncron. bypass input	±0.5 to ±3 Hz with slew rate of changes <0.5 Hz per second; ±0,05 Hz free running.
5. Environmental	
Ambient temperature	±0°C to + 40°C in normal UPS condition, -25°C ... +60°C in storage condition; +15°C to +25°C recommended for batteries
Altitude	Max. 1000 m in normal UPS condition
Humidity	5 to 95% RH, non-condensing
Heat dissipation	UPS 6P 160 kVA: 8.96 kW
	UPS 6P 200 kVA: 11.2 kW
	UPS 6P 250 kVA: 14 kW
	UPS 12P 160 kVA: 10.24 kW
	UPS 12P 200 kVA: 12.8 kW
	UPS 12P 250 kVA: 16 kW
	UPS 400 kVA: 24 kW
	UPS 500 kVA: 30 kW
Cooling air	UPS 160-250 kVA: 3000 m^3/h (833 l/s)
	UPS 400 kVA: 4800 m^3/h (1333 l/s)
	UPS 500 kVA: 5100 m^3/h (1416 l/s)
Audible noise	70 dB(A) max - ISO 7779
6. DC circuit	
6.1 Battery type	Valve Regulated Lead Acid or vented lead acid
6.2 Battery charging	Advanced Battery Management™ or traditional float charging
6.3 Nominal battery voltage	UPS 160-250kVA: 384 VDC (192 cells)
	UPS 400-500kVA: 480 VDC (240 cells)

6.4 DC bus ref. in float mode	2.25 VPC without ABM
Temperature compensation:	3mV/(cell.°C) when monitoring probe is installed
6.5 Battery cut-off voltage	1.7 VPC (volt per cell)
6.6 Battery charging current	
(according to the batt. data)	UPS 160-250 kVA: from 10 to 250 A
	UPS 400-500 KVA: from 20 to 250A
6.7 Max Battery discharging current	
(@1,7VPC - 320VDC):	UPS 160 kVA: 420A
	UPS 200 kVA: 525A
	UPS 250 kVA: 650A
	UPS 400 kVA: 840A
	UPS 500 kVA: 1050A